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Potentially Toxic and Hazardous Substances in the Industrial Organic Chemicals and Organic Dyes and Pigments Industries

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Potentially Toxic and Hazardous Substances in the Industrial Organic Chemicals and Organic Dyes and Pigment Industries

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The objective of this program were identification of the potential hazards associated with the production and use of industrial organic chemicals (IOC) and organic dyes and pigments (ODP) and determination of the state of the art of the control and treatment of potentially hazardous waste generated during manufacture and use of these materials. The major study outputs are comprehensive master tables of 510 IOC, 142 ODP raw materials, 722 ODP intermediates and 1458 dyes and pigments containing correlated compounds identification, toxicity data, chemical production process information. Eight "priority rating" lists containing chemicals ranked in order of quantitative toxicity or production data and twelve "priority" lists with chemicals presented alphabetically were extracted from the master tables. Although about 150 compounds are thus shown to pose potential toxic hazards, the toxicity data were found to vary widely in both availability, and in precision where available in replicate. Consequently these simplistically prepared lists must be used with caution. Pollution control and waste treatment technologies applicable to these industries are discussed and summarized, but "best" technologies for specific compounds/processes are not specified.

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POTENTIALLY TOXIC AND HAZARDOUS SUBSTANCES IN THE INDUSTRIAL ORGANIC CHEMICALS AND ORGANIC DYES AND PIGMENTS INDUSTRIES

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FOREWORD

When energy and material resources are extracted, processed, converted and used, the related pollutional impacts on our environment and even on our health often require that new and increasingly more efficient pollution control methods be used. The Industrial Environmental Research Laboratory - Cincinnati (IERL-Ci) assists in developing and demonstrating new and improved methodologies that will meet these needs both efficiently and economically.

This report "Potentially Toxic and Hazardous Substances in The Industrial Organic Chemicals and Organic Dyes And Pigments Industries" is part of a continuing effort to better understand the environmental impact of these major industrial sectors. It summarizes the results of a literature search for toxicological information on the major chemical compounds and elements which are the major raw materials, products and intermediates for selected chemical processes. While this work was orginaly intended to supplement other efforts, it can also be used as a reference of available toxicological information.

David G. Stephan
Director
Industrial Environmental Research Laboratory
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ABSTRACT

The objectives of this research program were the identification of the potential hazards associated with the production and utilization of industrial organic chemicals (IOC) and organic dyes and pigments (ODP) and the determination of the state of the art of the technology for the treatment and control of potentially hazardous wastes generated during the manufacture and use of these materials. The major output of the study consists of comprehensive master tables of 510 IOC, 142 ODP raw materials, 722 ODP intermediates and 1458 dyes and pigments, containing correlated compound identifications, toxicity data, chemical production process information, waste product information, production volumes and end use information where available.

Work done to establish definitive criteria for prioritizing the IOC and ODP according to toxic hazard produced a substantial set of potential criteria. However twenty "prioritized" lists that were actually produced were based solely on the various types of toxicity data, and the production volume data, contained in the master tables. Eight of these tables were assembled with the chemicals ranked in order of quantitative toxicity or production volume data and can be viewed as "priority rating" lists. The compounds in the remaining twelve tables are presented alphabetically and can be considered useful "priority" groups. These tables identify some of the chemicals that pose the greatest potential hazards. However, because the availability of specific data types on individual compounds is limited, these tables are all incomplete compilations. For example the most prevalent single data type, acute oral data on rats (LD50, oral-rat), is available on about 59 percent of the IOC. The other data types are available on 31 percent to one percent or less of the IOC, and 20 percent, or less of the ODP. Although a total of about 150 of the IOC on these various lists appear to pose potential toxic hazards, the toxicological data, taken from secondary compendia, were shown to range widely in precision where replicate data were available. Consequently these simple "prioritized" lists must be used with caution. Comparison of eight of these "prioritized" lists with four EPA priority lists produced 45 IOC common to the two sets of priority lists of possible special significance in terms of hazard potential. Because of the complexity of these industries and the present state of toxicological data availability and understanding, this study should be viewed as a beginning effort.

Assessment of the state of the art of pollution control and waste treatment technology showed that most of the published information is of a general nature. It was not possible to specify "best" technologies for particular chemicals/processes given the broad scope and the time and funding available for this study.

CONTENTS

Page

Disclaimer ii
Foreword iii
Tables viii
Acknowledgment xi

1. Executive Summary 1
2. Introduction 7
3. Objectives 10
4. IOC and ODP Industry Comparisons 12
5. Research Approach 13
6. Master Table Compilation 15
    Information Included in Master Tables 15
        Name and Formula 17
        Identifying Symbols 17
        Toxicity Data 17
            Acute Toxicity Data 17
            Chronic Toxicity Data 18
            Additional Background on the Toxicity Data 19
        TLV 19
        Compound, Process, and Waste Data 19
        Total Production Volumes 19
        Uses 20
    Data Availability 20
        Industrial Organic Chemicals 20
        Organic Dyes and Pigments 21
        Toxicity Data - IOC 22
            Quantitative Human Toxicity Data 22
            Carcinogenic, Teratogenic and Mutagenic Data 22
            Quantitative Oral Toxicity 22
            Quantitative Inhalation Toxicity 23
            Additional Quantitative Toxicity Values 23
            IOC (Table A-1) Summary 23
        Toxicity Data - IOC Addendum 24
        IOC Toxicity Data - Overall Summary 24
        Toxicity Data - ODP 24
            ODP Raw Materials and Intermediates 24
            ODP Dyes and Pigments 25
            ODP Toxicity Data Summary 25
        Process Data 25
        Waste Stream Data 25
        Production Volumes 25

Page
7. Data Extraction Tables 27
   IOC Extraction Tables 27
      U.S. Occupational Standard (USOS) for Concentration in Air-Industrial Organic Chemicals Listed Alphabetically According to Compound (Table E-1) 27
      USOS Standards Listed According to Increasing Standard Concentrations (Table E-2) 27
      Human Toxicity Data (Table E-3) 28
      Carcinogens or Suspected Carcinogens (Table E-4) 28
      Teratogens and Mutagens (Table E-5) 28
      Oral Toxicity (LD50, Rat) (Table E-6) 29
      Oral Toxicity (LD50, Animal Other Than Rat) (Table E-7). . . 30
      Inhalation Toxicity (LC50) (Table E-9) 31
      Mixed Toxicity Data (Table E-10) 32
      Production Volume Data 32
   ODP Extraction Tables 32
      U.S. Occupational Standard (USOS) for Concentrations in Air--Organic Dyes and Pigments Listed Alphabetically According to Compound (Table G-1) 32
      Human Toxicity Data--Organic Dyes and Pigments (Table G-2) . 33
      Carcinogens and Suspected Carcinogens--Organic Dyes and Pigments (Table G-3) 33
      Oral Toxicity (Rat)--Organic Dyes and Pigments (Table G-4, G-5, and G-6) 33
8. Prioritization Schemes 34
   Priority or Rating Lists 34
   EPA Priority Lists 35
   Comparison of This Study "Priority" Lists and EPA Priority Lists 36
   Comparison of U.S. Occupational Standards (USOS) with USSR Workplace Standards 37
   Preliminary Attempts to Establish Rating Criteria 38
      Toxicity Data Pitfalls 38
      Data Unavailability 39
         Tentative Criteria for Use in the Identification and Priority Listing of Hazardous Industrial Organic Chemicals 39
9. Pollution Control Technology 43
   Effluent Pollution Control Technology 43
   Air Pollution Control Technology 44
      Incineration 46
      Adsorption 47
      Absorption 47
      Condensation 47
      Inertial Separators 47
      Wet Collection Devices 47
      Baghouses 48
      Electrostatic Precipitators 48
      Other Collection Devices 48

Page

10. Organic Dyes and Pigments Industry 50
    Background 50
    Industry Characteristics 50
    Hazardous Substances 50
    Pollution Controls 51
        Emissions Controls 51
        Effluent Controls 52
11. Conclusions 54
12. Recommendations 58
    References 61

Appendices

A. Industrial Organic Chemicals-Toxicity Production, Waste and Use Data 64

B. Organic Dyes and Pigments-Toxicity, Production, Waste, and Use Data Associated with Dyes and Pigments and the Raw Materials, Intermediates and Inorganic Chemicals Used in Dye and Pigment Production 302

C. Key to Abbreviations and Acronyms Used in Tables in Appendices A and B 600

D. Industrial Organic Chemicals - Possible Additions to the Master List 602

E. Industrial Organic Chemicals - Extraction Tables Based on Toxicity and Production Volume Data in Table A-1 609

F. EPA Priority Lists 657

G. Organic Dyes and Pigments - Extraction Tables Based on Toxicity and Production Volume Data in Tables B-1 through B-3 674

H. USSR Maximum Allowable Concentrations of Harmful Compounds in Working-Area and Inhabited Area Atmospheres 684

TABLES

Number		Page
A-1	Industrial Organic Chemicals-Toxicity, Process, Waste, Production and Use Data	64
A-2	Industrial Organic Chemicals Addenum - Toxicity	268
A-3	Industrial Organic Chemicals, Inorganics - Toxicity	290
B-1	Organic Dyes and Pigments, Raw Materials - Toxicity Process, Waste, Production and Use Data	302
B-2	Organic Dyes and Pigments, Intermediates - Toxicity Process, Waste, Production and Use Data	308
B-3	Organic Dyes and Pigments - Toxicity Process, Waste, Production and Data	416
B-4	Addendum to Table B-3	586
B-5	Organic Dyes and Pigments, Inorganics - Toxicity Process, Waste, Production and Use Data	592
C-1	Key to Abbreviations and Acronyms	600
D-1	Radian List of Compounds to be Added to the List of Industrial Organic Chemicals	602
D-2	Industrial Organic Chemicals Not on the IOC List or on Table E-1 - from a 1975 Petrochemical Compilation	604
D-3	1973 U.S. Tariff Commission Report Compounds Not Elsewhere Listed	605
D-4	Additional Compounds to be considered for Inclusion in IOC Table A-2	606
D-5	Compounds Not Already Included Which Are Covered by Effluent Limitations Guidelines Development Documents - Organic Chemical Industry	607
D-6	Organic Chemicals in IPPEU-IOC but with No Process Number - Possible Additions to the IOC List	608

Number		Page
E-1	U.S. Occupational Standard (USOS) for Concentrations in Air-Industrial Organic Chemicals [Listed Alphabetically According to Compound]	609
E-2	U.S. Occupational Standard (USOS) for Concentrations in Air - Industrial Organic Chemicals [Listed According to Increasing Standard Concentrations].	
E-3	Human Toxicity Data - Industrial Organic Chemicals	616
E-4	Carcinogens or Suspected Carcinogens - Industrial Organic Chemicals	621
E-5	Teratogens and Mutagens	623
E-6	Oral Toxicity (LD50, Oral-Rat) Versus Production Volume, Waste and Carcinogen Data - IOC	626
E-7	Oral Toxicity (LD50, Animal Other Than Rat Values ≦ 500 mg/kg) Versus Production Volume, Waste and Carcinogen Data - IOC . .	632
E-8	Oral Toxicity (LDLo, All Animals) Versus Production Volume, Waste and Carcinogen Data - IOC	633
E-9	Inhalation LC50 Data Versus Carcinogen, Production, and Emission Data	634
E-10	Toxicity Data ≦ 500 mg/kg or ≦ 1000 ppm Not included in Tables E-6 Through E-9 -- Any Animal or Administration Route	636
E-11	Total Production - Industrial Organic Chemicals [Listed Alphabetically According to Compound]	638
E-12	Total Production - Industrial Organic Chemicals [Listed According to Increasing Production for 1973]	647
E-13	Industrial Organic Chemical Human and Animal Toxicity and Carcinogen Data Added During 1979 Revision	650
F-1	Effluent Guidelines Priority List (IOC - Phase 1)	657
F-2	Effluent Guidelines Priority List (IOC - Phase 2)	658
F-3	Water Quality Planning and Standards Consent Decree List . . .	659
F-4	Potentially Significant Air Toxicants From the Office of Air Quality Planning and Standards (AQPS)	662
F-5	This Study "Priority" List IOC Distribution on EPA Priority Lists	663

Number		Page
F-6	Lists of Potentially Hazardous Waste Materials	665
F-7	Spills List of Potentially Hazardous Substances	670
G-1	U.S. Occupational Standard (USOS) for Concentrations in Air-Organic Dyes and Pigments	674
G-2	Human Toxicity Data - Organic Dyes and Pigments	675
G-3	Carcinogens and Suspected Carcinogens - Organic Dyes and Pigments	676
G-4	Oral Toxicity (Rat) - Organic Dyes and Pigments, Raw Materials	678
G-5	Oral Toxicity (Rat) - Organic Dyes and Pigments, Intermediates	679
G-6	Oral Toxicity (Rat) - Organic Dyes and Pigments, Dyes	682
G-7	Organic Dye and Pigment - Raw Material, Human and Animal Toxicity and Carcinogen Data Added During 1979 Revision	683
H-1	Comparison of United States and USSR Occupational Standards	684
H-2	Maximum Allowable Concentrations of Harmful Compounds in Working-Area Atmosphere	690
H-3	Maximum Allowable Concentrations of Harmful Substances in Atmospheric Air of Inhabited Areas - USSR	702

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SECTION 1

EXECUTIVE SUMMARY

In view of the increasing concern created by rapidly expanding industrial production of organic chemicals, and of toxic substances and hazardous waste legislation, the EPA has expanded studies of the organic chemicals industry. Prior programs have usually been limited to studying relatively small numbers of specially selected compounds or oriented toward studying broad classes of pollutants such as BOD, COD, total hydrocarbons, etc. A need exists for studies that will provide a comprehensive and detailed data base covering the entire industry and the hundreds of compounds produced by it. The present task was initiated as one effort to satisfy this need by compiling information that would satisfy the following two objectives:

(1) Identify the potential hazards associated with the production and utilization of industrial organic chemicals and organic dyes and pigments industries.

(2) Determine the state of the art of the technology for the treatment and control of potentially hazardous wastes generated during manufacture and use of these materials.

The research followed to reach these objectives included the following:

- Literature search and assessment of literature obtained
- Compile master tables of toxicity, process, waste, production volume and use data
- Attempt to identify definitive criteria for prioritizing the compounds according to relative hazard
- Extract lists of compounds from the master tables according to various specific types of toxicity data, or production volume data. These lists can be viewed as approximate "priority lists"
- Acquire EPA priority lists and compare with this study "priority lists"
- Assess pollution treatment and control technology.

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In the principal effort made to reach the objectives, a data base has been assembled that will allow ongoing analysis of the hazard posed by the production and utilization of industrial organic chemicals (IOC) and of organic dyes and pigments (ODP) and their raw materials and intermediates. The major output of the study consists of comprehensive master tables listing 510 IOC, 142 ODP raw materials, 722 ODP intermediates and 1458 actual dyes and pigments. The tables contain the following correlated information, where available:

- Compound identification
- Comprehensive toxicity data
- Chemical production process information
- Waste product information (quantitative data where available)
- Production volumes
- End uses (quantitative use patterns where available).

These master tables can therefore serve as convenient, single sources of readily available, detailed information on specific compounds/processes, or as guides to identifying and selecting groups of compounds for evaluation, field study, effluent guidelines studies, new source performance standards for air emissions and the like. They are also data pools useful in assembling various data arrays specifically applicable to the analysis of toxic hazard potential. As part of the present task a number of data extraction tables were assembled, each keyed to a specific data type in the master tables. Eighteen (18) different tables or lists of this type were assembled based on the following types of data:

- United States Occupational Standards (USOS)
- Human exposure toxicity data (accidental exposure reports)
- Carcinogenic data
- Mutagenic and teratogenic data
- Acute toxicity data
    - Oral
    - Inhalation
    - Miscellaneous administration routes
- Production volume data.

Eight of these data extraction tables contain the chief data type arranged in ordered fashion (for example, in decreasing level of acute toxicity value). Additional pertinent data, such as correlated carcinogenicity, production volume and waste product data are also included in some of the extraction tables. Individually these tables represent "priority rating lists" of various types that are potentially useful in assessing toxic hazard. It is important to note, however, that the variations in data types represented on these individual lists make it impossible to assemble a single, master list, of "prioritized IOC".

In a separate effort EPA priority lists developed prior to and independently of the present study were identified and obtained. Six of these lists are presented in the report, with four of them, shown below, receiving special attention.

(1) Effluent Guidelines Priority List - Phase I Organics

(2) Effluent Guidelines Priority List - Phase II Organics

(3) Water Quality Planning and Standards Consent Decree List (65 Toxic Pollutants List)

(4) Potentially Significant Air Toxicants from the Office of Air Quality Planning and Standards (OAQPS).

These four EPA lists were first compared with the master lists of IOC and ODP developed on this study, to show the overall commonality of compound entrants (110 common out of 128 total entrants in the four EPA tables). This is 86 percent commonality with most of the eighteen entrants not in the IOC master lists being in categories that fall outside the scope of the present study (plasticizers, insecticides, etc).

Seven of this study's "priority lists" (IOC tables E-4 through E-10, Appendix F) were then compared with the above four EPA priority lists to determine commonality of the IOC entrants. There are 46 IOC (29 percent of 161 candidates on the seven "priority lists") common to the four EPA priority lists. These compounds and certain subsets of them discussed in the report are the compounds on the EPA lists that presumably pose toxic hazards on the basis of the readily available toxicity data. Thus they constitute one group of the IOC that should be considered for future EPA studies. However there are many (over 100) compounds on the "priority lists" developed on this study (including both IOC and ODP intermediates and dyes and pigments) which are not on the EPA priority lists but which are equally good candidates for continued EPA investigation. These are discussed in detail in Sections 7 and 8 in the report.

Problems inherent in the available data must be kept in mind when attempting to use the master tables or the extraction ("priority") tables for prioritization of compounds according to toxic hazard potential or for selecting compounds for continued in-depth EPA studies. These relate to data availability, data quality and prioritization criteria concerning the following:

- List of compounds of industrial significance
- Toxicity data types and relative availability
- Production volume data
- Waste stream data

The original list of about 350 IOC upon which this study was based has been expanded to over 500 compounds (including isomeric forms) in the course of the study. However there are still compounds of industrial significance not included, since it is difficult to determine with certainty which of the thousands of known organic compounds are actually produced commercially, when many of them are produced by only one company, frequently for captive use, and production data are not released. The toxicity data summary which follows pertains only to the 418 IOC included in Table A-1.

About 88 percent of these IOC have some toxicity dava available, and 80 percent have quantitative data. Only 6.9 percent of the ODP intermediates and dyes and pigments have quantitative data. It is emphasized that toxicity data vary widely in terms of the test protocols followed. The consequence is that the data types and the reliabiliity of the data produced also cover a considerable range. Thus specific toxicity data types that can reasonably be compared for toxic hazard purposes are much fewer in number than the overall amount of available quantitative data indicate. The most prevalent common protocol data are oral data obtained on rats to determine the amount of a chemical producing death within several days to a week (acute toxicity) in 50 percent of a rat population (LD50, oral-rat). These data are available on 59 percent of the IOC. Other specific data types are available on 31 percent to 1 percent, or less, of the IOC. All these data were of necessity extracted from secondary literature sources (toxicity data compendia) which do not provide information on the quality of the specific data. Analyses of replicated data, where it is available, have shown that the agreement ranges from excellent to poor (data value ratios of essentailly 1 to 50 are observed). These data availability and data quality analyses show that the "priority" or "rating" schemes described above, which are based on simple arrays according to selected quantitative toxicity data types, must be used with caution. Also they indicate the need for additional, common protocol, toxicity testing on many compounds that already have quantitative toxicity data.

Production volume data were obtained on about 40 percent of the Table A-1 IOC, as follows:

Production Level, kg/yr (lbs/yr)	Number of Compounds Listed
$\leq 4.5 \times 10^8$ $(\leq 10^9)$	36
$4.5 \times 10^7 - 4.5 \times 10^8 (10^8 - 10^9)$	66
$4.5 \times 10^6 - 4.5 \times 10^7 (10^7 - 10^8)$	52
$4.5 \times 10^5 - 4.5 \times 10^6 (10^6 - 10^7)$	9

Thus there are at least 102 IOC with production levels of 4.5 million kg/yr (100 million lbs/yr) and 193 total compounds with quantitative production data. Most of the high volume products $\geq 4.5 \times 10^7$ kg ($\geq 10^8$ lbs) have some types of quantitative toxicity data available but the types vary greatly, as described above. However there are also 60 percent of the IOC (80 percent of ODP intermediates and dyes and pigments) which have no production volume data readily available. It would be desirable to establish whether any of these compounds are high production level items.

The amount of the IOC or ODP escaping to the environment during production and use is one of the most important data types bearing on determination of toxic hazard. There are quantitative data, ranging widely in availability of specific compound information, on 28.4 percent of the IOC (none of the ODP). This includes effluent data on 3.8 percent of the IOC and air or emissions data on 24.6 percent of the IOC. The range of effluent and emissions levels reflecting production factor variations is not available. Neither is specific information on data collected or analyses protocols. Consequently the reliability of the data cannot be assessed at present. Furthermore there is an obvious need for obtaining more quantitiative data, especially on more toxic compounds for which no such data are presently available.

The attempts to establish definitive criteria for prioritizing the IOC and ODP according to toxic hazard have so far succeeded only in producing a substantial set of potential criteria. These are listed in the report together with the steps taken to produce them. In the absence of a formula that would allow quantitative, or even qualitative, evaluation of all important criteria factors, simplistic "prioritization" or "rating" schemes, as described above, were devised based solely on toxicity and production volume data.

An assessment of the state of the art of pollution control technology for handling effluents and emissions from the IOC and ODP industries was carried out. It was determined that most of the published information on these technologies and the processes to which they are applied is of a general nature. These facts, plus the extremely large number of compounds/processes involved in this study, and the very large percentage of expenditure of available time and funds required to satisfactorily tabulate and analyze the toxicity, process, production volume, waste and use data, led to a decision to limit the control technology assessment to general coverage. Summaries of the major pollution control equipment and techniques applicable to the control of the effluents and/or emissions from IOC production processes are presented, together with some comments on their strengths and weaknesses. Since the applicability and efficiencies of organic pollutant removal varies widely depending on the specific chemical/process, it was not found possible to specify "best" technologies on a generalized basis. Further assessment of control technologies will be required in future studies.

The ODP industry and its special requirements for effluent treatment are discussed in a separate section of the report. In view of the unique situation this industry faces in controlling pollutants and because of the rather small amount of published information this study found, three companies producing ODP were interviewed to obtain first-hand opinions. The concensus of these interviews, unsubstantiated by independent corroboration, is that gas and vapor emissions can be effectively controlled by the use of commercially available absorbers, scrubbers, and filters, while effluents (except for highly toxic heavy metals) can be controlled by a central treatment facility. An advanced, proprietary water treatment system now being tested in full scale operation at a plant manufacturing disperse dyes has been described to Battelle as very promising. This system is described in the report.

One environmental pollution problem peculiar to the ODP industry results from the production of dyes with a significant solubility in water. Sodium chloride added to "salt out" or precipitate the dye product results in effluent containing large amounts of salt and much larger amounts of colored substances than are encountered from other dye or pigment processes. Plants using this type of process should be located near the ocean to avoid contamination of fresh water with salt.

The outputs of this study described above provide the EPA with a foundation data base and a preliminary analysis of the toxic hazard potentials presented by the IOC and ODP industries and their thousands of products. However, in view of the extreme complexity of these industries and the present state of toxicological data availability and understanding, the study should be viewed as a beginning effort. More work needs to be done to insure that all the important data (commercially produced chemicals, toxicity data, production volumes, waste products data, end use patterns, environmental stability) have been obtained. Potentially important sources of this information which were not utilized on the present study due to time and funding constraints include the producing companies themselves (product brochures, annual reports, personal contacts), industry organizations (published reports, personal contacts) and the primary literature (computer searches of Chemical Abstracts, Index Medicus, Predicasts, etc and retrieval of significant articles). Collection of information by these routes would be time consuming but might provide significant amounts of new and important data.

Considerable additional evaluation of the presently available data is also possible. Perhaps the most valuable approach would be to expand or modify the Radian Corporation computer data base to include the new data from the present study. This would allow more facile compilation and comparisons of "priority" lists. Also compilation of the various data types keyed to specific chemical structural features would become possible. However, even without a computer aid, further analysis of the present data base is possible. Additional extraction table compilations of potential value can be constructed. These could include:

- Compounds listed according to decreasing production volume correlated with various specific toxicity data

- Compounds listed in order of toxicity data not yet specifically analyzed (e.g., LD50, animal data obtained by administering the chemical by routes other than oral or inhalation)

- Compounds listed in order of total organics emissions (quantitative data).

Of course continuation of efforts to identify the important criteria for evaluating toxic hazard potential are certainly in order. Finally, further assessment of control equipment and technology needs to be carried out.

SECTION 2

INTRODUCTION

Industrial organic chemicals (IOC) and organic dyes and pigments (ODP) are derivative products from naturally occurring materials, largely petroleum and natural gas, which have undergone at least one chemical reaction such as oxidation, hydrogenation, halogenation, sulfonation, nitration or alkylation, and which will undergo at least one additional chemical reaction before leaving the industry, or be used in a solvent or coloring function. The production of primary organic raw materials by the petroleum refining industry via distillation, cracking, and reforming operations is excluded from this study. IOC and ODP chemicals are further identified under the 1972 Standard Industrial Classification Manual (SIC) of the U.S. Department of Commerce. These include group 286, Industrial Organic Chemicals subcategories Industry No. 2865, Cyclic (Coal Tar) Crudes, and Cyclic Intermediates, Dyes, and Organic Pigments (Lakes and Toners) and Industry No. 2869, Industrial Organic Chemicals, Not Elsewhere Classified. However certain classes of compounds covered by these SIC codes are excluded from consideration. These are pesticides, herbicides, insecticides, other agricultural chemicals, pharmaceuticals, explosives, plasticizers, and coal tar residues and distillates other than cresols or other chemically distinct compounds. There are also some grey areas of compound classes such as tanning agents, rubber processing chemicals, and flavoring and perfume chemicals which are not covered systematically, although a few chemicals from some of these groups do appear on the master tables.

The specific chemicals to be covered in detail in this study were those contained in the Industrial Process Profiles for Environmental Uses, Chapters 6 and 7. These chapters are entitled, respectively, "The Industrial Organic Chemicals Industries" (1) and "Organic Dyes and Pigments Industries" (15) (references are listed on page 61). Chapter 6 (March 30, 1976, draft) has undergone extensive revision since the present study was completed in December 1976. Consequently the process description data extracted from Chapter 6 and presented in this study were revised and updated in mid-1979.

The production of organic chemicals, as defined above, has grown tremendously in both volume and importance, in the several decades since the Second World War. The organic chemicals industry provides the raw materials used by at least ten other major industries. These are (1) plastics and resins, (2) synthetic fibers, (3) synthetic rubber, (4) solvents, (5) plasticizers, (6) pharmaceuticals, (7) dyes and colorants,

(8) surfactants, (9) explosives, and (10) agricultural chemicals, including herbicides and pesticides. As the number and total amount of organic chemicals commercially produced has expanded, the type and quantities of these chemicals escaping to the environment during manufacture and use has increased accordingly. Emissions of volatile compounds represent by far a greater variety of chemical types than are introduced from all other stationary sources combined. Yet, collection of information on which compounds are emitted in what quantity, and what sort of toxic hazard they pose, is only beginning. Quantitative data are relatively sparse and of uncertain accuracy. Commerical introduction of organic chemicals into surface and groundwaters also poses great problems, but quantitative data on specific chemicals are again sparse. It has become increasingly clear in the past decade that many of these chemicals, either because of inherent toxic properties, or because of the sheer volume of their release or, in some cases, their persistance in the environment, are hazardous.

In fact, toxic hazard crises related to this industry are occurring with dismaying frequency. Thus a number of individual compounds (e.g., β-naphthylamine, DDT, dioxin, vinyl chloride, kepone, etc) have been first exposed as potent health or environmental hazards and then subjected to very close scrutiny, but organic chemicals as a class have only just begun to be investigated. In the face of these facts and with comprehensive federal toxic substances and resource conversation and recovery acts now enacted, the EPA has recognized there exists an urgent need for well organized and correlated baseline data and information on the range of compounds produced. This includes the following information on these compounds:

- identification of as complete a list of commercially produced compounds as possible
- comprehensive toxicity data
- producing companies and plant sites
- production process details
- production volumes
- environmental loss modes and amounts
- technology to control or eliminate escape or loss
- downstream product uses (normal product fate).

Consequently the present study was contracted by the EPA as one initial effort to meet these needs. The specific purpose of this project was to prepare a report containing comprehensive, collated information on portions of these need areas listed below. This report could serve as a convenient, single source of quickly available, detailed information on specific compounds or as a guide to identifying and selecting groups of compounds for evaluation, field study, effluent or emissions standards studies, etc. To obtain the information needed to compile the report, this study addressed the following subject areas:

(1) Identify potentially hazardous materials

(2) Compare the chemical products selected with various EPA priority lists

(3) Assess the treatment and control technology of emissions from production processes

(4) Identification of the major uses of the most hazardous materials

(5) Provide summaries of the effectiveness of treatment and control technologies and suggest areas in which new or improved technology is needed.

SECTION 3

OBJECTIVES

The overall objectives of this task study were the following:

(1) Identify the potential hazards associated with the production and utilization of industrial organic chemicals and organic dyes and pigments.

(2) Determine the state of the art of technology for the treatment and control of the potentially hazardous wastes generated during the manufacture and use of these materials.

The general approach taken to assess the potential hazards of the IOC and ODP industries was to conduct a computerized and hand literature search and quickly assess the output to select appropriate documents for use in the study. Because of the very short time period (10 weeks) originally allotted for the entire study, only readily available secondary literature (books, encyclopedias, monographs, readily available government reports) were sought. Primary literature such as papers containing original data were not sought. Then an intense data selection and organization effort was mounted to provide collated information for evaluation as quickly as possible. To reach the objectives the following specific subtasks were established and carried out concurrently:

Subtask 1: Identify the sources of both industrial organic chemicals and organic dyes and pigments included in the Industrial Process Profiles and the wastes associated with their production.

Subtask 2: Obtain and codify published data on the toxicity or hazardous nature of industrial organic chemicals and organic dyes and pigments.

Subtask 3: Propose criteria for ascertaining the relative importance of the hazardous nature of the different potentially toxic and hazardous chemicals.

Subtask 4: Assess the state of the art of treatment and control technology for both production processes (Subtask 1) and for major uses of potentially the most toxic and hazardous chemicals (Subtask 3).

Subtask 5: Identify areas where additional data or information is needed to satisfactorily complete Subtasks 1 through 4.

Subtask 6: Make recommendations for research and development on new or improved control equipment or technology.

SECTION 4

IOC AND ODP INDUSTRY COMPARISONS

The two major groupings of IOC and ODP were studied and organized into separate collated data sets. This was dictated primarily by the fact that the basic information on each was available in separate documents arranged according to different and basically incompatible formats. This in turn reflects the facts that ODP production is a major and completely segregated subgroup of the organic chemicals industry dependent on highly specialized batch processes while IOC production is, for the most part, characterized by much higher volume continuous processes, many of which are vapor phase and/or do not require intimate process water contact. Most IOC products are low molecular weight, frequently liquid, or low melting solid, compounds whereas ODP final products are relatively high molecular weight, high melting or infusible and slightly soluble materials. Consequently, ODP technology (processing product isolation, product utilization) is highly specialized and the technical literature and nomenclature are unique, requiring special background to interpret.

A major tabular compilation format (described below) was designed which allowed both sets of compounds to be entered on the same blank forms. Once the basic data were available in the same organized presentation, the manipulation and study of the data was amenable to parallel interpretation. Although the extracted data sets used for analysis and prioritization studies were kept separate for identification during use, they are very similar. Consequently, much discussion of determination of toxic hazard and prioritization was unified. Nevertheless, due to the above described special nature of the ODP a brief separate discussion of this industry is provided in a later section.

SECTION 5

RESEARCH APPROACH

To meet the objectives of the study, the following methodology was adopted:

(1) A literature search was conducted [hand and computer - Systems Development Corporation (SDC) Off-Line Citation List producted from National Technical Information Center (NTIC) files].

(2) Master tables of industrial organic chemicals and organic dyes and pigments containing correlated toxicity, process, waste, production volume, and use data were assembled. These central data repositories were then used in all subsequent work.

(3) An attempt was made to identify and propose criteria for ascertaining the relative importance of the hazard posed by the chemicals.

(4) Various lists of data were extracted from the master tables. Some of these lists can be viewed as "priority lists".

(5) Various EPA toxic chemicals priority lists were acquired or assembled and compared with the extraction lists.

(6) An assessment of treatment and control technology was undertaken.

The literature search emphasized the identification of appropriate major secondary data compilations which could be used to prepare the master tables. A computer search produced 259 government reports while about 20 standard reference works pertinent to Subtasks 2, 3, and 4 were identified and obtained through the Battelle library facilities. The most important and frequently used references are Items (1) through (17), on pages 61 and 62. These references include process and compound sources (1,9,10,12,15), toxicity compilations (2,3,4,8,16), production volume data sources (6,9,11,12,14), and information on uses (4,7,13,17).

The compilation and processing of the master tables, which are presented in Appendices A and B, turned out to be a massive undertaking which required a major portion of the effort. However, the output of this effort represents what is believed to be a valuable and unique set of information never before assembled in such a fashion. These tables are discussed in detail in the next section. They are central repositories of correlated data that serve as the main output and focal point of the study.

The effort to identify and establish criteria for priority rating industrial organic chemicals and organic dyes and pigments proved to be a very difficult and challenging task. Suggested criteria and approaches for using them are listed and discussed but no formal approach adopted as yet. This work is discussed in Section 8, starting on page 38.

In the absence of solid, detailed criteria for identifying hazardous materials at the present time lists of chemicals based on various types of toxicity data or production volumes were extracted from the master tables. Mostly these are based on raw toxicity data arranged in numerical sequences of decreasing toxicity. Some of these extraction lists are correlated with quantitative waste data and production volumes. These lists can be handled as "priority" lists for the present, although their use must be undertaken with considerable care, keeping in mind the simplistic approach with which they were assembled.

Nonetheless, these "priority" lists of IOC and ODP can be compared with various EPA priority lists that were obtained or assembled. In this way different lists or methods of ranking IOC and ODP for potential hazard can be compared to determine degree of commonalility and to aid in selecting highest priority compounds/processes for further study.

Literature pertaining to treatment and control technology was also obtained. Evaluation and compilation of this information has allowed summaries of the state of the art in effluent and emissions control to be assembled. The applicability of these controls to specific processes is, however, beyond the scope of this present project. Also three industry contacts were made concerning orgnic dyes and pigments, since relatively little published information is available on pollution control in this special segment of the chemical industry. Some very interesting information, presented in the discussion of ODP (page 51), was obtained during these contacts.

In summary, an initial assessment of the information and data pertinent to the potential hazards posed by the production of IOC and ODP by industry can be accomplished by the results described in the following sections. However, in view of the breadth and complexity of this industry and the present state of toxicological data availability and understanding the study must be viewed as a beginning effort which has not yet probed the subject in depth with the funds and time allotted.

SECTION 6

MASTER TABLE COMPILATION

Master tables of toxicity, process, waste products, production volume, and end use data (Appendices A and B) were assembled. The main lists of organic compounds and organic dyes and pigments that are included were taken from the Industrial Process Profiles for Environmental Use, Chapter 6, The "Industrial Organic Chemicals Industry" (1) and Chapter 7, "Organic Dyes and Pigments Industries", (15). These EPA compilations of industrial chemical process information, which were draft documents being edited by Radian Corporation, Austin, Texas, when the present study was carried out in 1976, were chosen as the basis for this study, since they were the most recent comprehensive compilations of process and end use data available when this quick response task was started. The comprehensive toxicity data presented were taken from the major available compendiums (references 2, 3, 4, and 8). These master tables now comprise basic tools for addressing the major task of assessing the toxic hazard posed by the production and use of industrial organic chemicals (IOC) and organic dyes and pigments (ODP). Once the degree of toxic hazard posed by the products and their associated waste streams (emissions, effluents, sludges, and solids) has been established, an assessment of applicable waste and pollution control technology will be possible.

INFORMATION INCLUDED IN MASTER TABLES

The tables are arranged as facing page (two page) layouts which present, on the left hand page the following information:

- Name and formula (where applicable) of IOC or ODP, with selected cross-references supplied
- Chemical Abstract Registry number and Wiswesser Line Notation (WLN) identifying symbols
- Oral toxicity data - LD50 refers to the dose that produces death in 50 percent of the exposed animal population. Any value $\leq$500 can be considered a potential toxic hazard. Also LDLo (Lowest lethal dose) data are listed here.
- Toxicology - includes all toxicity data other than oral LD50 and LDLo, and carcinogenic data. Thus all other administration routes (skin, inhalation, etc) are presented here. Definitions of exposure mode acronyms are in Appendix C. Also listed there

are summary narrative descriptions of human or animal physiological symptoms or malfunctions.

- Threshhold limit value (TLV) - includes current and selected recommended U.S. occupational standards
- Carcinogenic data

On the right hand page of the tables are presented the following:

- Sources of products (raw materials, catalysts, solvents)/Process Type (ammonolysis, oxidation, etc)
- Process number from references 1 or 15
- Waste stream information (quantitative data when available - emissions factor units are lbs/ton, as originally reported)
- Waste treatment used in present process (when available)
- Total production of IOC and dye raw materials or intermediates in millions of kilograms/year; ODP in thousands of kg/year
- Uses of compound, especially downstream syntheses or manufacture of new organic chemicals, polymers, etc (quantitative use patterns presented where available)
- References

The information contained in the master tables, as outlined above, is described in greater detail in the following sections.

Name and Formula

The name under which the compound is listed in references 1 and 15 is listed first for both IOC and ODP. IOC are then further identified in most cases with an alternative descriptive name and molecular and empirical formulas.

Identifying Symbols

The Chemical Abstract (CA) registry number and Wiswesser Line Notation (WLN) are listed for most of the compounds. The CA number is a unique identifier in the American Chemical Societies' Chemical Abstracts index system. It provides a search key if future literature searches for information on specific compounds are needed.

WLN symbols were taken from (2, 1975 Ed.), or determined, as needed. They express chemical compound structures as a linear string of symbols. The resulting notation is compact and unique for each compound. It is particularly suitable for computer processing, especially for sorting compounds on the basis of selected functional group or structural features such as amino, chloro, benzene rings, etc, or combinations of features. Thus computer storage of compound and process data, keyed to WLN symbols, will allow facile recall and display of toxicity data (and other data) for compounds or sets of compounds. Eventually computer storage should provide a tool for helping to develop criteria for rating toxic hazard. Once such rating criteria are established computer processing can be expected to aid in prioritizing compounds/processes for various purposes relative to potential hazard.

Toxicity Data

Toxicity information presented, as outlined above, includes various acute and chronic quantitative test data, together with qualitative hazard ratings and narrative summaries of physiological symptoms and malfunctions. Almost all of the quantitative data were obtained by administering the test compound to a group of animals using a particular exposure route, although a few quantitative human data, based on accidental exposures are also listed.

Acute Toxicity Data--

The most readily and frequently obtained toxicity data are acute data obtained by single dose administration followed by observation of the animals for several hours to 1 week. Symptoms and death or death rate are commonly the data recorded. Proper determination of LD50 data is accomplished by delivering different quantities of the test compound to various groups of animals and statistically determining the dose producing 50 percent deaths. Lethality estimates other than 50 percent, e.g., 1 percent, LD1 or 99 percent, LD99 can also be determined. Lowest lethal doses (LDLo) are also obtained using these test procedures. Inhalation tests to determine LC50 values are similar except the experiment must involve a finite exposure time (preferably 4 hours) in addition to controlled air concentrations of the test compound. Results of acute tests on different species can show the spread of biological variation and reveal, for example, the major organs or systems involved, assuming of course that the data have been obtained under conditions that allow valid comparisons. A problem inherent in the toxicity data compilation in the master tables is that the data are extracted from secondary compilations. Consequently direct assessment of the precision or accuracy of the data is not possible.

Acute toxicity test data, especially LD50 values obtained by the same administration route (equivalent test protocols), can normally be considered comparable for at least first approximation rating purposes. This is done and extraction (rating) tables are discussed in Sections 7 and 8. Even LD50 data obtained using different animals but the same administration route are generally usable for at least order of magnitude comparisons. This can be seen, for example, by scanning the LD50, oral test data in Tables A-1, A-2, B-1 and B-2. There are exceptions, of course, and some of these are summarized later, on pp 30 and 31.

A useful toxicity comparison scale for this study (cf references 2, 1975 Ed., page xviii and 16, page 19) is the following:

Acute LD50 Value	Scale
≤1 mg/kg	poisons
1 to 50 mg/kg	highly toxic
50 to 100 mg/kg	very toxic
100 to 500 mg/kg	moderately toxic
0.5 to 5 gm/kg	slightly toxic
>5 gm/kg	essentially nontoxic.

A similar arbitrary LC50 scale (inhalation data) can be constructed by considering 2 ppm ($\simeq$ 0.4 mg/m^3) inhalation exposure as equivalent to 1 mg/kg on the LD50 scale. On this basis, an oral LD50 of 500 mg/kg would be considered equivalent to an LC50 of 1000 ppm (or ~ 200 mg/m^3) inhalation exposure (preferably 4 hour exposure). This arbitrary rating scale will be used as the basis of identifying categories of toxicity in subsequent discussions in this report.

Chronic Toxicity Data--

Quantitative chronic test data presented in the tables include carcinogenic, teratogenic and mutagenic data. These data types are obtained by studying the effect of repeated administration of the compound over varying periods of time, usually months or 1 or more years. Of necessity this type of test covers an appreciable span of the typical animals lifetime and requires careful test design, including control groups. All animals must be subjected to pathological examination. Data recorded under carcinogen include both true carcinogens, i.e., cellular tumors which are normally fatal or are associated with the formation of secondary tumors (metastasis), and neoplasms, i.e., all other tumors. These data represent an extreme range of test conditions, i.e., animal type/dose administration route/exposure mode and time. Thus ranking carcinogenic data for comparison purposes is very difficult, even though it is clear that some compounds are appreciably more potent carcinogens than others. An unordered list of compounds producing carcinogens or neoplasms (as determined by testing on animals) will be presented later. Teratogenic (nonhereditary birth defects) and mutagenic (permanent genetic changes) effects data are the other quantitative chronic data listed. Chronic effects such as irreversible renal, hepatic, heart, central nervous system, etc, damage produced by long term exposure are covered by the narrative summary discussions under the toxicology heading. Reference 3 (Sections 9 and 12) should be referred to for a fuller explanation of this information and more complete data where desired.

Additional Background on the Toxicity Data--

It is necessary to refer to the abbreviations and acronyms list (Appendix C) in order to decipher the toxicity entries in the tables. A more thorough discussion of the subtleties and intricacies of toxicological testing and the nature of toxicity data are beyond the scope of this study. However these factors should ultimately be considered in determining toxic hazard priorities. For a more complete description of this subject the reader is referred to (2,3), especially to the criteria section in (2) and Sections 9 and 12 in (3), and to reference 16, chapters 2-5, 10, and 13 in particular.

TLV

Threshold limit values were established originally by the American Conference of Government Industrial Hygienists. They were adopted by OSHA in 1971 as official occupational workplace standards (U.S.O.S. or United States Occupational Standards). TLV's were established on the basis of the best available information from industrial experience and from experimental human and animal studies. They are not intended as a relative index of hazard or toxicity. However these standards do indicate the level of concern they engender as individual compounds on the basis of workplace experience and experimental toxicity data.

Compound, Process, and Waste Data

These entries are summarized adequately in the outline. Information in these columns found in Tables A-1 through A-3 and B-1 through B-4 was taken from refences 1 and 15. Additional data on wastes (emissions factors) was derived from reference 12. Since reference 1 has since undergone extensive editing and revision by Radian Corporation and the Environmental Protection Agency it was necessary to change some of the entries under these headings in 1979. This is particularly true of the process numbers. Quantitative waste stream data taken from reference 1 (Air: and Water: data) are presented in the original units. The emissions factors units are lbs of emitted chemical per ton of product.

Total Production Volumes

Production data are for total product, summed for all processes, taken from references 6, 9, 10, 11, 12, and 14. They are 10^6 kg/year, IOC and ODP-raw materials and intermediates, and 10^3 kg/year, ODP-dyes and pigments.

Uses

Qualitative use data are adapted from reference 1 while quantitative use patterns are from reference 13. The quantitative use data in reference 13 were compiled from references 6 and 17.

DATA AVAILABILITY

Industrial Organic Chemicals

As described earlier, the basic list of IOC used in compiling Table A-1 was taken from reference 1. Table A-1 contains an extensive listing of the IOC (418 numbered items). These include 353 different basic organic chemicals, plus 65 isomeric forms. However as the compilation of Table

A-1 proceeded it became apparent that not all organic chemicals that should be included in this study were in reference 1. Since this determination was made about 170 additional compounds have been identified from various sources (Tables D-1 through D-6, Appendix D; and Tables F-1 and F-2, Appendix G) that are considered potential candidates for inclusion as IOC. These tabulated sources of the 170 additional compounds include the following:

(1) Table D-1. Radian Company List of Compounds to be Added to the List of Industrial Organic Chemicals

(2) Table D-2. Industrial Organic Chemicals Not on the IOC List or on Table D-1 - from a 1975 Petrochemical Compilation[(a)]
(a) Hydrocarbon Processing

(3) Table D-3. 1973 U.S. Tariff Commission Report Compounds Not Elsewhere Listed

(4) Table D-4. Additional Compounds to be Considered for Inclusion in IOC Table A-1[(a)]
(a) Randomly identified.

(5) Table D-5. Compounds Not Already Included Which Are Covered by Effluent Limitations Guidelines Development Documents - Organic Chemicals Industry

(6) Table D-6. Organic Chemicals in Reference 1 but with no Process Number - Possible Additions to the IOC List

(7) Table F-1. Water Quality Planning and Standards Consent Decree List

(8) Table F-2. Potentially Significant Air Toxicants from the Office of Air Quality Planning and Standards (AQPS).

A group of 92 of the approximately 170 candidates was identified as being pertinent due to known or probable commercial availability, presence on an EPA priority list, or the availability of toxicity data that represent a potential hazard. Consequently these compounds were tabulated using the same format in Table A-2, Industrial Organic Chemicals Addendum - Toxicity, Process, Waste, Production and Use Data. Nineteen (19) of these compounds were among 33 listings suggested for addition to reference 1 by Radian Corporation (Table D-1 above) in their compilation of the Organic Chemical Producers Data Base Program (reference 12). These compounds are identified with the Radian identifying (computer) number in parentheses, under the Table A-2 item number. The remaining 14 compounds listed by Radian had already been included, either in Tables B-1 or B-2 (ODP raw materials or intermediates), or had already been incorporated in Table A-1 earlier.

Inorganic chemicals associated with the production of the IOC of Table A-1 are listed in Table A-3 for information purposes. Many of these compounds are quite toxic and may sometimes be found in waste streams from IOC production. The consideration of these inorganic chemicals is outside the scope of this study but they may need consideration in follow-on studies.

Organic Dyes and Pigments

The ODP master tables include raw materials (Table B-1), intermediates (Table B-2), and dyes and pigments (Table B-3) taken from reference 15. There are 32 raw materials used in ODP production listed in Table B-1. Three of these compounds (item numbers 11, 26, and 31) are also listed in Table A-1. In addition, 113 compounds listed in Table A-1 are marked DP, indicating that these are also dye and pigment raw materials. Thus, there are a total of 142 ODP raw materials included in these two tables. ODP intermediates (764 items) are listed in Table B-2. However, 42 of the numerical sequence of listed items are actually cross-reference indicators, so that the number of unique compounds listed is 722. In addition, 26 of these are also in Table A-1, so that the number of new compounds is actually 696. ODP are found in Table B-3 (1458 items) and Table B-3 Addendum (30 items). However, ODP in the addendum table are only modifications (e.g., food dye forms) of the ODP in Table B-3.

Essentially the same data was obtained on these items as for IOC. The major differences were that appreciably less toxicity and production data were found but that many more compounds had to be searched to obtain these data. Some qualitative but no quantitative waste data were available. No attempt was made to identify end uses for specific ODP. Inorganic chemicals associated with ODP production are listed in Table B-4, along with inorganics in Table A-3 marked DP. The same comments apply to these inorganic chemicals as were made earlier for IOC-associated inorganics.

Toxicity Data - IOC

A brief summary of the various tabulated toxicity data is provided here to show the extent of available data. These data are tabulated in various e extraction tables discussed below and also in Section 6 - Data Extraction Tables (cf Appendix E). The data are extracted from Appendix A, Table A-1.

Quantitative Human Toxicity Data--

Human toxicity data are available on 126 compounds (30 percent of IOC). These data are listed in Tables E-3 and E-13. Examination of these tables shows 98 reported deaths resulting from exposure to specific compounds. However, 67 of these data are toxic hazard scale estimates derived from reference 39 (as listed in reference 2, 1977 edition), rather than actual lethality data. Thus 31 of the deaths listed in Tables E-3 and E-13 are based on actual reported death incidents, while the remaining 67 are apparently estimates based on animal test data. These 67 data are taken from a toxic hazard rating scale, e.g., 5-50 mg/kg, extremely toxic. Hence they are always in units of 5, 50, 500 or 5000 mg/kg.

Carcinogenic, Teratogenic and Mutagenic Data--

Carcinogenic or neoplastic effects have been observed on 63 (15 percent) of the IOC (Tables E-4 and E-13). Of these, six are recognized human carcinogens, two others are suspected human carcinogens and at least 14 are potent animal carcinogens. A potent carcinogen is arbitrarily defined here as any recognized human carcinogen or any animal carcinogen or neoplasam response from any exposure ≤ 1 gm/kg body weight by any route over any time period.

Also 12 compounds (3 percent) are teratogens or mutagens, with 7 of these (58 percent) also carcinogens (Table E-5). Five of these items (IOC numbers 86, 101, 187, 204, and 286) were added during the 1979 revision. There are also 6 IOC-Addendum (Table A-2) compounds listed because of the importance of this data type. Included with these are 2 new additions (IOC-ADD 42 and 65) since 1976.

Quantitative Oral Toxicity--

The master table of IOC (Table A-2) contains 418 number compound listings. These include 353 different basic organic chemicals, plus 65 isomeric forms. There are 326 (78 percent) of these compounds with quantitative oral toxicity data of widely varying types. However, the most prevalent toxicity data that can be fairly compared for evaluating relative toxic hazard is LD50, oral-rat. These data are available on 245 (59 percent) of the 418 compounds (Table E-6). Of these data, 64 values (26 percent of 245, 15 percent of 418) are ≦ 500 mg/kg. These compounds are given ordinal ratings as a function of decreasing toxicity in Table E-6.

Also 130 compounds (31 percent of 418) have LD50, oral-animal other than rat. Of these data, 107 are on compounds that also have LD50, oral-rat data, i.e., they are overlap data. However 23 (5.5 percent of 418) of these data are on compounds that do not have LD50, oral-rat data, with 2 of these (0.15 percent of 418) values ≦ 500 mg/kg (cf Table E-7, rating no's 1 and 6). Also listed in Table E-7 are an additional 14 compounds with LD50, oral-animal other than rat toxicity data ≦ 500 mg/kg. These are compounds which have LD50, oral-rat data > 500 mg/kg. Thus a total of 276 (66 percent) of the 418 IOC compounds have some other type of LD50, oral data, with 87 (21 percent) showing some values ≦ 500 mg/kg.

There are also 95 compounds with LDLo, oral-any animal data. Sixteen (16 or 1.2 percent of 418) of these compounds (Table E-8) have LDLo, oral ≦ 500 mg/kg, but do not have LD50, oral-rat data at this toxicity level.

Summarizing to this point, oral toxicity data values ≦ 500 mg/kg are available as follows:

LD50, oral rat	64 compounds
LD50, oral-animal other than rat	2 compounds
LDLo, oral-animal other than rat	16 compounds.

Thus at least 82 (20 percent) of the IOC have acute oral toxicity data that indicate they may represent toxic hazards.

Quantitative Inhalation Toxicity--

There are quantitative inhalation toxicity data on 116 (28 percent) of the 418 IOC. Thirty-one (31, 7.4 percent) of these are LC50 data, while the rest are LCLo or TCLo data. The LC50 data (Table E-9) include about 18 compounds (4.3 percent of 418) showing lethality at $\leq$ 1000 ppm or $\leq$ 200 mg/m^3 (arbitrary scale), (variable animal and exposure time). About 11 (2.6 percent) of these compounds show lethality at the 500 ppm or lower level. The rating order shown must be considered approximate in view of the variations in the tests and results (animals, exposure time, units).

Additional Quantitative Toxicity Values--

A number of remaining toxicity data, varying widely in terms of animal, chemical administration path and exposure mode/time are grouped together in Table E-10. Only those data $\leq$ 500 mg/kg or 1000 ppm are included and the data are arranged alphabetically according to compound. There are 59 items listed in unordered fashion due to the wide variation in the data types. An additional 15 compounds added to this list during the 1979 update are in Table E-13. Thus a total of 74 (18 percent) are in this category. Some of these compounds have LD50, orl-rat $\leq$ 500 mg/kg.

IOC (Table A-1) Summary--

About 88 percent of the 418 IOC have some toxicity data (quantitative) or information (qualitative) presented. About 80 percent have quantitative data while the remaining 20 percent have only qualitative information. However, it must be emphasized that, in spite of the rather numerous quantitative data presented, by far the most prevalent data obtained under conditions that permit reasonably valid data comparisons are LD50, oral-rat. These data exist on only 59 percent of the IOC. Also most of the compounds that do not have LD50, oral-rat data have no common data base, since the other LD50 data, the LC50 data, the LDLo and LCLo data are each available on only about 31 percent, or less, of the IOC and were obtained using a wide range of animals and exposure modes. Thus there is only moderate to slight internal consistency in these data. Overall the available data may be summarized as follows:

Compound category or toxicity type	Percent of IOC
Toxicity information of any type	88
Quantitative toxicity data--all types	80
Oral toxicity data--all types	78
LD50, oral--all animals	64
LD50, oral-rat	59
Inhalation toxicity data--all types	28
Carcinogenic or neoplasam data--all types	15
LC50, ihl--all animals	6
LC50, ihl-rat	4
Mutagenic or teratogenic data--all types	3

There are sufficient toxicity data available to provide a basis for determinating the relative hazard potential of most of the high volume IOC. Consequently, the task of selecting candidate products/processes for such purposes as new source performance standards evaluations can go forward.

However there are serious gaps in the toxicity data base, as demonstrated above, and searches for additional data and identification of compounds requiring additional experimental toxicity evaluation should be instituted.

Toxicity Data - IOC Addendum

There are 92 additional IOC compounds recommended for addition to the master IOC list in Table A-2, together with the readily available toxicity data. These IOC compounds show a similar breakdown of available toxicity data. Inspection of this table (there are no extraction tables) shows LD50, oral-rat available on 57 compounds (62 percent). Six more compounds (6 percent) have other LD50 data or LC50 data. Of these data 15 LD50, oral-rat values (16 percent) are ≦ 500 mg/kg and 7 (7.4 percent) other LD50 and LC50 values ≦ 500 mg/kg or ≦ 1000 ppm are available. Thus 63 compounds in this table (68 percent) have LD50 or LC50 toxicity data with at least 22 of these data (23.9 percent) indicative of potential hazards. Seventeen compounds (18 percent) have carcinogenic data, with about 10 (10.9 percent) of these showing potent carcinogenic potential. There are also 5 compounds with teratogenic or mutagenic data, with one of these also a carcinogen. Thus the data are similar in availability to master Table A-1.

IOC Toxicity Data - Overall Summary

To summarize, the combined IOC data compilations show that a good amount of toxicity data is available. About 88 percent of all IOC covered have some type of toxicity data. These data should prove very useful in rating the potential hazard of IOC when analyzed together with other factors such as production volumes, losses to the environment during production (waste stream factors), significant use patterns, and other factors such as physical and chemical properties and environmental stability.

Some serious gaps are identified in the toxicity data base. For example, the data presented identify a number of compounds that are candidates for LD50, oral-rat testing, in order to provide a more complete common data base. Also volatile compounds that do not presently have LC50 data and numerous compounds that do not have carcinogenic test data but might be anticipated to show carcinogenic potential are present. These data gaps can be filled in one of two ways. Searches of the primary literature can be done to obtain data not yet added to the secondary compendiums used as data sources in the present study. The data gaps still remaining should then be filled by additional toxicological testing. Compounds to be tested and toxicity data to be sought should be selected only after careful analysis of the updated data base.

Toxicity Data - ODP (Appendix H)

ODP Raw Materials and Intermediates--

There are LD50, oral-rat data on 10 of 31 (32 percent) ODP raw materials (Table G-4), with 5 of the values (16 percent) ≦ 500 mg/kg. Only 48 (6.5 percent) of the 722 intermediates have LD50 oral-rat data with 15 (2 percent) ≦ 500 mg/kg (Table G-5). There are 7 dyes (Table G-5) with LD50 oral-rat data, none of which is below 500 mg/kg. The total list of raw materials and intermediates (753 compounds) has 13 human toxicity exposure data (2 lethal) (Table G-2) and 45 carcinogenic data entries (Table G-3). There are 6 recognized human carcinogens in the intermediates table, and several more compounds with potential carcinogenic animal test data that suggest that these compounds should be scrutinized more closely. There are no inhalation data presented on these compounds. Table G-7 contains 4 human and 4 animal 1979 data.

ODP - Dyes and Pigments--

There are 22 (1.5 percent of 1458) dyes and pigments with carcinogenic data (Table G-3). About 6 of these appear to be potent carcinogens in animal tests. Only 7 dyes and pigments have oral toxicity data. One dye has human lethality data (Table G-2) available. No inhalation toxicity data were found.

ODP Toxicity Data Summary--

Toxicity data are available on 150 ODP intermediates and dyes and pigments, with most of the data on intermediates. This is only 6.9 percent of the total of 2180 intermediates and dyes and pigments. Hence far fewer toxicity data are available on this class of products, then on the IOC.

Process Data

Reference 1 and 15 were relied on for production process data, since these prior EPA studies had attempted to obtain this information in detail. The Radian Organic Chemical Producers Data Base Program (Reference 12) updated this information on IOC. As additional process information becomes available, it should be incorporated into updated versions of the present report.

Waste Stream Data

Quantitative waste stream data, which includes data on 1 or more specific compounds in each case, are available on 119 of the IOC (28.4 percent of 418). This includes water effluent data on 16 compounds and air emissions data on 18 compounds from Reference 1 and emissions factor data on 85 compounds from Reference 12. These data vary widely in availability of specific compound information. The range of effluent and emissions levels relative to industrial production over appreciable time periods is not available. Neither is information on how the data were collected or how the calculations were made. Consequently the validity and accuracy of the data are not known. Only a small amount of qualitative information is available on ODP products.

Production Volumes

Production volume data were obtained from the best available sources. Data are available on 163 (39 percent) of the IOC compounds in Table A-1. They are also presented on 27 (29 percent) of the 93 compounds in IOC addendum Table A-2. Production data presented cover years ranging from 1968 through 1978, with most data for 1973 (124 items, 39 percent). 1973 is considered the best recent base year for comparing compounds on the basis of relative production levels, since it represents data prior to the major perturbations resulting from the oil embargo and subsequent raw materials and energy shortages, and the effects of the 1974 economic recession. Data for the 50 highest volume compounds in 1978 (10, June 11, 1979) are also included in Tables A-1 and A-2.

ODP production volumes are available on 23 (3 percent) of 722 intermediates (Table B-2) and 273 (19 percent) of 1458 dyes and pigments (Table B-3).

The major source of production volume data is the U.S. Tariff Commission (9,10). This government agency collects statistical data on industrial production directly from the companies. However, quantitative data are only published if there are 3 or more producing companies. This is done to protect the confidentially of the data when only 1 or 2 producers are involved. Hence, these data are in the USTC files but are unavailable for public disclosure. All other published data ultimately are derived from figures released for publication by the producing companies or from data estimates based on known industrial capacities and general production levels.

SECTION 7

DATA EXTRACTION TABLES

The master tables (Tables A-1, A-2, A-3, B-1, B-2, B-3, and B-4) are thorough compilations of correlated data and information. They can be used as convenient references for many types of data on IOC or ODP compounds or processes. However, the information contained in these master compilations can be put to use much more effectively or efficiently if various types of data or information are extracted and presented in more compact correlations. A number of these more readily usable data extractions have been identified and compiled for use on this task study. No doubt additional combinations or ways of correlating or presenting the data can, and will be, devised. Most of the extraction tables have already been referred to and some of the contents discussed in Section 6, since they were convenient sources of data on the range of data availability. Thus their contents and meanings have already been discussed to some extent. There are two sets of extraction tables presented, those on the IOC in Appendix E and those on the ODP in Appendix G. There are 13 IOC extraction tables (Tables E-1 through E-13) and 7 ODP extractions tables (Tables G-1 through G-7). These tables, what is in them and the reasons for their compilation are described below.

IOC EXTRACTION TABLES

The 13 tables are given in sequence, followed by a brief description of their contents and usefulness.

U.S. Occupational Standard (USOS) for Concentrations in Air-Industrial Organic Chemicals Listed Alphabetically According to Compound (Table E-1)

The USOS are workplace standards developed from industrial experience and experimental animal studies. They are not intended as relative indices of hazard or toxicity but they do indicate a level of concern engendered on the basis of human experience. The list of compounds represents commercial compounds that have come into question in the past and should therefore include many of the IOC or ODP that are potential health hazards.

USOS Standards Listed According to Increasing Standard Concentrations (Table E-2)

Experience has presumably resulted in accidental exposures, or testing has produced data, on which of the USOS compounds pose the greatest health threat. Thus listing them with the lowest exposure level compounds first provides one approach to identifying compounds that should be looked at very closely across their spectrum of properties.

Human Toxicity Data (Tables E-3 and E-13)

Accidental human exposure data of four types are listed: LDLo, LCLo, TDLo, and TCLo. The exposure mode and toxic effect are noted, with the quantitative exposure data. Of particular note are at least 31 cases of death noted after exposure to various of the chemicals (LDLo and LCLo). It seems reasonable to subject those compounds which have caused human death, especially at low or moderately low exposure concentrations (cf Table E-3), to closer scrutiny. Of lesser note but still important are the IOC which have produced toxic effects but not death. Again, the compounds producing measurable effects at the lowest doses or concentrations should be the greatest cause for concern. Since the modes of exposure and the resultant exposure levels have varied so widely no attempt has been made to order the compounds in terms of relative hazard potential. This list of compounds can be compared with the other lists to be described below, for commonality of entrants.

Carcinogens or Suspected Carcinogens (Tables E-4 and E-13)

Chemicals which produce tumors (cancerous growths or neoplasms) are of particular concern today to the average person. This is true even though acute or chronic health conditions of other types may also be likely to occur to the average citizen.

In view of this special interest, carcinogens have been listed separately in the master tables and have been extracted into Tables E-4 and E-13. The TCLo quantitative data, administration mode/animal, and toxic effect noted are listed. As in the case of human exposure data, the modes of test and resultant data units are so variable that no attempt was made to present the compounds in order of decreasing toxic effect. It is not possible on the basis of the present study to determine which compounds pose the greatest toxic hazard, beyond those compounds already labeled as known human carcinogens. Each of these compounds should be viewed as candidates for further study and for comparison with the other lists for commonality.

Teratogens and Mutagens (Tables E-5 and E-13)

Eleven (11) compounds with animal test data indicating that they are teratogens and 1 with data implicating it as a mutagen, are listed in Tables E-5 and E-13. It is of interest that 5 of the 11 compounds with teratogenic data, also have been implicated as potent carcinogens. When this is coupled with carcinogenic potential, these compounds are of high toxic hazard potential and should be included in any list of compounds to receive further, close study.

There are also 4 teratogens and 1 mutagen in this table from the IOC Addendum list (Table A-2), and 3 dyes that have shown potent teratogenic characteristics in animal tests. Two of these are also animal carcinogens.

All categories of chemicals (IOC, ODP) covered by this study were included in this table because of the small total number of compounds involved. These compounds should also be compared with the other lists of toxic data to determine commonality.

Oral Toxicity (LD50, Rat) (Table E-6)

As described earlier this is by far the most prevalent toxicity data that can be fairly compared for ranking purposes. There are data on 59 percent of the IOC, with at least one-fourth (15 percent of the IOC) at an LD50 level ($\leq$ 500 mg/kg) that can be considered a potential hazard level. These data are arranged in order of increasing LD50. Of course, lowest LD50 equates with highest toxicity.

Any data on carcinogenicity (Tables E-4 and E-13) and teratogencity or mutagenicity (Tables E-5 and E-13) are also cross-listed in Table E-6. Production volumes and the existence of quantitative waste stream data (Table A-1) are also listed. Thus, this table is one of the most important extraction tables, containing four types of correlated information that bear on determining whether compounds pose a potential hazard and "prioritizing" the relative degree of hazard posed. The existence of commonality, whether it is 2, 3 or all 4 data types, and the ranking of each data type (LD50, carcinogenic potential, production volume, quantitative loss patterns), are all of obvious importance in determining which compounds/processes are most hazardous. However, a method of weighting (prioritization criteria) these widely differing factors is not yet available. Determination of realistic weighting criteria while difficlut, should be pursued.

It can be concluded, however, that the most toxic compounds (for example, the first 64 items in Table E-6) should be viewed with special care. Each of these compounds which is produced in sizeable volume, which has been implicated as having carcinogenic potential or which has known losses of the product or the greatest potential losses through accidents, should be evaluated as carefully as possible. Furthermore, some compounds ranked above 64 should also be considered potential hazards, particularly if they are produced at higher volumes than some more toxic chemicals, if they are implicated as carcinogens, or if the processes by which they are produced are known to have sizeable waste losses of the product.

One important observation to-be noted is that only 41 (64 percent) of the first 64 compounds have any one of the other 3 data available and that compounds with 2, or all 3, correlated data are very few. Thus, any scheme that can be developed for quantifying assessment of these four data types can only be applied to a very few of the compounds at the present time.

It should also be pointed out that the accuracy of the LD50 levels shown in Table E-6 is essentially unknown. Where LD50 data have been obtained on the same compound in two or more testing programs the results may or may not agree closely. This can be quickly seen by scanning the data in Table A-1. However, in some cases the variation is relatively great. This is shown as follows:

IOC Item No.	LD50 Values, oral-rat	Ratio
39	5700/3800	1.5
51	3100/1230	2.5
70	4360/790	5.5
81	8790/2940	3.0
103	2078/886	2.3
111	2020/242	8.3
116	1400/290	4.8
201	580/95	6.1
308	2828/1297	2.2

The reasons for these variations (many sizable) are unknown but presumably is related to study protocol or data processing differences. They show that rating schemes must be viewed with caution!

Oral Toxicity (LD50, Animal Other Than Rat) (Tables E-7 and E-13)

Oral toxicity LD50 data are also available in which animals other than rats were used. Data of this type up to LD50 values of 500 mg/kg are listed in Tables E-7 and E-13. These are data on compounds not listed in Table E-6, i.e., not subjected to acute oral toxicity tests using rats. The same additional correlated data are present, but fewer of these data are available. Similar LDLo data are found in Table E-8, not discussed.

Table E-7 compounds should be roughly comparable in potential toxic hazard to those in Table E-6 at similar LD50 values. However, it should be pointed out that in some cases where LD50, oral values have been determined on two or more animals, the results vary widely, e.g., by ratios as great as 50/1. The following data variations cited from Table A-1 illustrate this:

IOC Item No.	LD50 Values, animal	LD50 Ratio
10	17 rat/3 mus	5.7/1
12	46 rat/7 rbt	6.6/1
16	340 rat/2400 mus	7.1/1
19	54 rat/96 mus	1/1.8
25	3030 rat/200 mus	15/1
37	1300 rat/28 mus	46/1
41	890 rat/75 bdw	12/1
75	180 rat/900 mus	1/5
83	500 rat/100 rbt	5/1
89	76 rat/165 mus	1/2.2
111	2020 rat/242 mus	8.3/1
114	300 rat/6 mus	50/1
160	698 rat/316 mus	2/1
163	2800 rat/1122 mus	/1
165	535 rat/3700 mus	1/6.9

IOC Item No.	LD50 Values, animal	LD50 Ratio
173	268 rat/1265 mus	1/4.7
191	1020 rat/400 rbt	2.6/1
265	481 rat/60 mus	8.0/1
309	447 rat/1414 mus	1/3.2
312	891 rat/2462 mus	1/2.8
314	1072 rat/330 mus	3.1/1
340	1860 rat/65 mus	29/1
368	5000 rat/316 mus	15/1

These data variations may be partly due to differences in response between animal types, or as above, to test or data evaluation protocol variations. These data comparisons certainly reinforce the conclusion that rating schemes must be approached cautiously. They also indicate the need for additional, more carefully controlled tests to be done on many compounds, using a common protocol.

Inhalation Toxicity (LC50) (Tables E-9 and E-13)

The inhalation data that are most reasonably grouped together (LC50) are presented in Tables E-9 and E-13. They are grouped in a roughly ordered fashion in Table E-9. Due to the variations in test protocols and data units comparisions must be viewed with caution and some skepticism. These data in Table E-9 are displayed with the same correlated data that are in Tables E-7 and E-8. Similar comments apply to their utility except that the relative ordering presented is probably less likely to be accurate, as described above, than the data in Tables E-7 and E-8. Nevertheless, it is clear that some compounds are more toxic than others when inhaled and the relative toxicity indicated by the rating order is probably a reasonable approximation of actual toxic hazard.

The number of these compounds (31) is a relatively small percentage (7.4 percent) of the IOC. It is no doubt an appreciably higher percentage of the volatile compounds (not accounted) but still surely represents only a minor fraction of the total. An appreciable number of the compounds in the table do have production volume data and some emissions data. These items should be analyzed in detail to determine which ones present the greatest hazard potential. However, the master list of IOC should also be reviewed to determine which volatile compounds with no quantitative inhalation toxicity data are produced in moderate to large volume, or are potential carcinogens, or have other acute or chronic test data that indicate they are moderately to highly toxic, or have quantitative emissions data.

Also, as in the case of the oral LD50 test data, there is an obvious need for testing using common protocols and data evaluation procedures. Round robin testing involving several laboratories should probably be done on selected compounds that are most likely to represent high hazard potential, using both LC50 and LD50 routes, to determine the reproducibility of these toxic test data and the effects of the different exposure modes.

Mixed Toxicity Data (Table E-10)

The data presented in Table E-10 cover a wide variety of animal type, administration route, etc. Consequently, these data cannot be rated according to relative toxicity. They are, however, at least crude indications of toxicity of high to moderate levels and provide additional compounds which need further consideration.

Production Volume Data

Production volume data are listed in Tables E-11 and E-12. All but 1978 (Table A-1) production volume data are presented in Table E-11. These data are ranked according to 1973 production in Table E-12. There are a total (Table E-11) of 36 compounds with production levels ≥ 1 billion lbs/yr and 102 with production levels ≥ 100 million lbs/yr. The production levels are summarized below.

Production Level, kg/yr (lbs/yr)	Number of Compounds Listed
$\geq 4.5 \times 10^8$ ($\geq 10^9$)	36
$4.5 \times 10^7 - 4.5 \times 10^8$ (10^8-10^9)	66
$4.5 \times 10^6 - 4.5 \times 10^7$ (10^7-10^8)	52
$4.5 \times 10^5 - 4.5 \times 10^6$ (10^6-10^7)	9

The highest volume products, especially those in the first two categories (≥ 45 million kg/yr or ≥ 100 million lbs/yr) should be most carefully reviewed for hazard potential. Even if these compounds are only slightly toxic, they may constitute potential hazards because of the greater opportunity that large quantities might escape to the environment during production or use. Consequently, all data available on these compounds should be reviewed with particular care.

ODP EXTRACTION TABLES

There are 6 ODP extraction tables. These are discussed briefly below. Many of the comments listed above under the IOC extraction tables also apply to the ODP extraction tables, where the same data types are presented.

U.S. Occupational Standard (USOS) for Concentrations in Air—Organic Dyes and Pigments Listed Alphabetically According to Compound (Table G-1)

The same comments apply as for the IOC. Inorganic chemicals are also listed since these are frequently used in ODP processes in relatively large amounts under circumstances where greater losses or human exposure potential may exist. However, further consideration of these inorganics is not pursued in the present study, as discussed earlier.

Human Toxicity Data--Organic Dyes and Pigments (Table G-2)

There are two recorded deaths, one after ingestion of an ODP intermediate and one upon intravenous exposure to a dye. The same comments apply as before, under IOC.

Carcinogens and Suspected Carcinogens--Organic Dyes and Pigments (Table G-3)

The discussion under the IOC extraction Table E-4 is also pertinent here. There are 5 recognized (human) carcinogens included in Table G-3.

Oral Toxicity (Rat)--Organic Dyes and Pigments (Tables G-4, G-5, and G-6)

LD50, oral-rat data are covered in these tables. Table E-6 is the equivalent IOC table. Table G-4 covers ODP raw materials from Table B-1, Table G-5 includes ODP intermediates from Table B-2 and Table G-6 covers the actual dyes and pigments in Table B-3. There are 5 raw materials, 15 intermediates and no dyes and pigments with LD50 values $\leq$ 500 mg/kg. (There are also 45 IOC that are ODP raw materials in this category.) Those compounds that also have available carcinogenic, teratogenic or mutagenic data or production volume data are indicated in the tables. As discussed earlier under Table E-6, those substances with commonality of data may represent greater potential hazards. Certainly compounds that show high acute toxicity and also show carcinogenic potenital and/or relatively high production volumes are likely to pose greater toxic hazards.

SECTION 8

PRIORITIZATION SCHEMES

It is known that some of the compounds in the master tables are toxic hazards--able or likely to inflict injury or death. If, then, they could be ranked in some way, it would be possible to start at the top of the list and work down to some level that is assumed to be safe. This part of the task is extremely important for it brings the other major objective of the task into perspective. It is extremely difficult to assess the treatment and control technology of emissions from all production processes. However, the assessment would become much more manageable if priority lists were available and the most hazardous compounds could be subjected to extensive investigations. Consequently an assessment of the various factors that might affect toxic hazard potential was undertaken. A number of factors were identified but no method for utilizing them in actual rating schemes was developed. This is viewed as a major undertaking that should be pursued in a separate study. The results of the assessment are listed at the end of this section for information purposes.

PRIORITY OR RATING LISTS

In the absence of a formula that would allow quantitiative, or even qualitative, evaluation of all important criteria factors, simplistic "prioritization" or "rating" schemes were devised based solely on the principal toxicity (LD50, LC50, carcinogenic TDLo, etc), production volume and waste product data. These "priority" lists were presented and discussed in Section 7 above as extraction tables. The extraction tables that can also be viewed as "priority" lists includes one set of tables which contain the compounds presented as a function of increasing or decreasing quantitaative values of various key data, such as LD50, oral-rat. "Priority rating" tables of this type include Tables E-2, E-6, E-7, E-8, E-9, and E-12 for the IOC and Tables G-4, G-5, and G-6 for the ODP. There are also several extraction tables in which the compounds appear in alphabetical order since it was not possible to attach an ordinal rating scheme to the data. However, these tables can still be viewed as "priority" lists, or sets of compounds that need special consideration as a group, for example those compounds with carcinogenic data. These "priority" lists include Tables E-3, E-4, and E-5 for the IOC and Tables G-2 and G-3 for the ODP. Discussions of the reasons for choosing these particular methods of "prioritizing" or "rating" the chemicals in terms of toxic hazard potential have already been presented in Section 7.

The "prioritized" lists described above, and in Section 7, provide a set of tools useful in providing preliminary analysis of the relative toxic hazard posed by a considerable number of the IOC (probably about 50 to 70 percent of the IOC in Table A-1). Table A-1 Addendum could be treated similarly, although time limitations did not allow this on the present study. The various lists can be compared with one another to determine commonality. Of course this has already been done to a considerable extent in terms of comparing carcinogenic potential and production volumes with the various acute toxicity data by including correlated data on single lists (Tables E-5 through E-10 and H-4 through G-6). However most of the extraction lists show only minor overlap of the IOC, thus reflecting the manner in which they were constructed (i.e., for the most part including only compounds which had not been already covered by a prior selection process on each new table assembled). Consequently the set of "priority rating " lists (tables) represents a number of different ranked sets that are each fairly unique in terms of compounds included but which are sufficiently different in ranking method as to make reordering into a master list of ranked compounds very difficult. Fusion of the separate lists into one master list can only be accomplished by assigning some sort of unifying weighting factors to each data component in each of the tables. It is not clear at the present time how this can be accomplished objectively and accurately. Consequently each of the lists must be viewed at present as a separate entity. The selection of compounds for further study cannot yet be done in such a way as to readily and objectively provide a single prioritized set of compounds for action. Nevertheless the "priority" lists as a whole do provide a means of selecting several sets of study candidates, mostly in some approximate order of importance, to meet such given specific objectives. Once lists of study candidates have been identified it may be possible, at least in some cases, to develop a unified list, or a reduced number of lists, through fresh analysis based on well defined objectives and possibly additional data for background information.

EPA PRIORITY LISTS

An attempt was made to identify as many EPA priority lists of organic chemicals as possible. Six (6) lists which resulted form this effort are included in Appendix F. They were placed between the Appendices for IOC and ODP "priority" lists for ease of comparison, especially with the IOC lists. The lists produced are presented in the following tables:

Table F-1. Effluent Guidelines Priority List (IOC - Phase 1)

Table F-2. Effluent Guidelines Priority List (IOC - Phase 2)

Table F-3. Water Quality Planning and Standards Consent Decree List

Table F-4. Potentially Significant Air Toxicants from the Office of Air Quality Planning and Standards (OAQPS)

Table F-6. List of Potentially Hazardous Waste Materials (reference 18)

Table F-7. Spills List of Potentially Hazardous Substances.

Table F-5 is a comparison list showing commonality of compounds on the present study "priority" lists (Tables E-3 through E-10) and the chief EPA priority lists of interest (Tables F-1 through F-4).

The EPA priority lists are for the most part described adequately by the table titles. The first 4 lists are considered to be the most pertinent and will be given special attention. The effluent guidelines lists (Tables F-1 and F-2) are taken from reference 19. Twenty (20) of the 21 entries in Table F-1 and 16 of the 19 entries in Table F-2 are represented on either Table A-1 (IOC), or one of the other master tables, of this study. Most of these representatives are IOC. The water quality planning and standards consent decree list (Table F-3) contains 66 individual entries with all but 3 of them (these 3 are mixed ethers, trichlorophenols and chlorinated cresols) specific compounds. Thirteen (13) of these 66 entries (blanks) are not represented on the present study master tables. This EPA priority list is the result of the so-called 65 toxic pollutants (both individual compounds and mixtures of compounds, or general classes of substances) that resulted from the recent court settlement (20) between the EPA and several environmental groups concerning implementation of best available technology (BAT) standards by June 30, 1983. The fourth EPA priority list (Table F-4) contains 22 entries, only one of which (a plasticizer) is not on the master tables. Thus these first 4 EPA priority lists are concerned with the IOC, ODP, and related substances that are presently being considered for effluents and emissions pollution control studies (e.g., Effluents Guidelines BAT standards and new source performance standards studies). Overall, commonality with master table entries (IOC, IOC Addendum and ODP) is very high. Most EPA list entries not included in the present study are insecticides, herbicides, plasticizers, etc, i.e., compounds that fall outside the scope of this task.

The last two EPA lists (Tables F-6 and F-7) are additional lists of potentially hazardous chemicals presented here for use in future studies of the toxic hazard posed by IOC. Table F-6 covers an earlier list of potentially hazardous materials developed by Booz-Allen, Inc. for EPA in 1973 (18). Table F-7 is the EPA spills list of substances potentially hazardous to the aquatic environment recently published in the Federal Register (5). Due to time constraints they will not be further discussed in this report.

COMPARISON OF THIS STUDY "PRIORITY" LISTS AND EPA PRIORITY LISTS

The first 4 EPA priority lists discussed above (Tables F-1 through F-4) were compared with this study "priority" lists (Tables F-4 through F-10) for commonality of the IOC. All compounds listed on 5 of 7 "priority" tables were comparison candidates. However not all the IOC on 2 of the "priority" lists were candidates. Thus, only compounds with LD50 $\leq$ 500 mg/kg (57 items) were covered from Table F-6 and only compounds with LC50 $\leq$ 1000 ppm or $\leq$ 200 mg/m^3 (15 items, 1 through 16, item 13 excluded) were covered from Table F-9. There are a total of 161 different IOC (38.5 percent of 418 total IOC) meeting this comparison candidate criterion on the 7 tables. The results of the comparison are presented in Table F-5 with the data displayed to show the occurrence of this study "priority" list IOC considered to pose a potential toxic hazard, on each of the 4 EPA priority lists. The addendum IOC (Table A-2), the updated 1979 data and the ODP were not included in this analysis because of lack of time.

There are a total of 45 compounds (27.9 percent of the 161 candidates) common to the 4 EPA lists. The occurrence of an IOC compound on one of the EPA lists is indicated by an X, 2X or 3X with the numerals referring to the number of present study "priority" lists containing the IOC compound. Thirty (30) IOC (item numbers 3, 17, 30, 39, 86, 101, 227, 243, 265, 284, 311, etc.) show multiple commonality on the EPA priority lists, with all but 2 of them (243 and 284) also showing multiple commonality on present study "priority" lists. The 28 IOC showing multiple commonality on both sets of lists should be given close consideration for further studies.

An accounting of the IOC appearing on the EPA lists shows the following:

	Total IOC Entries	Number of These IOC on Present Study "Priority" List	Percent Commonality
Table F-1	25	14	55
Table F-2	21	11	52
Table F-3	62	21	34
Table F-4	22	14	64

This tabulation shows the number of the IOC which are on one or more the 7 "priority" lists that also appear on the EPA priority lists (Tables F-1 through F-4), in comparison to the total number of IOC on each EPA list (commonality of EPA priority lists with present study master tables). The degree of commonality ranges from 34 percent for the Consent Decree list to a relatively high 64 percent for the OAQPS priority list. Presumably those IOC common to both sets of lists are worthy of closer scruting in terms of setting priorities on which compounds should be emphasized in future effluent or emissions studies, with the compounds showing multiple commonality as described above receiving the greatest emphasis. Of course, there are also compounds on the "priority" lists developed on this study which are not on the EPA priority lists that are probably equally good candidates for early studies (cf Sections 7 and 8 discussions). Further analysis, beyond that possible on the present task, will be required to properly set future study priorities. IOC addendum compounds are not included.

COMPARISON OF U.S. OCCUPATIONAL STANDARDS (USOS) WITH USSR WORKPLACE STANDARDS

Workplace standards have been established by the Soviet government (21) for 457 chemical substances. These standards are the Soviet equivalent of our USOS. They are reproduced in Appendix H, (Table H-2). These values may be of special interest since there is some indication that they were determined by the experimental use of human volunteers. This is based on a private communication from NIOSH (21) and is partially substantiated by an attachment to a copy of the original Russian article, which was hand carried to the United States by a former NIOSH employee. The attachment, although not part of the article, refers to principles and procedures for developing data for industrial air limits from human subject.

Efforts to determine whether human testing was in fact used to establish the Soviet standards should continue for two reasons. Firstly, these standards are set at lower exposure levels than the U.S. equivalents in 78 of 84 total comparisons, usually by substantial amounts (Table H-1). Consequently the Soviet standards may be leading indicators concerning which of our USOS are candidates for lower exposure level standards. Secondly, if the Soviet standards were actually established by controlled human testing, they may represent some of the best toxic hazard data available, concerning a large set of organic compounds, that were determined using a common well controlled test protocol. Furthermore they should represent realistic human exposure levels for avoidance of acute toxicity effects (chronic effects are very likely not accounted for).

PRELIMINARY ATTEMPTS TO ESTABLISH RATING CRITERIA

The information most pertinent for evaluating the hazard of each IOC is, of course, the toxicity data. However, the amount of IOC produced must also be considered as well as the use that is to be made of the chemical. For if only limited amounts of a very toxic chemical are produced, the hazard to the population might be much less than a moderately toxic chemical produced on a large scale. The same applies to the uses to which a chemical is put. If the use of a moderately toxic substance is such that a large number of people will be exposed to it, this is much worse than even a highly toxic compound that is, for example, used entirely captively or is completely consumed as an intermediate and not an end product. For example much HCN and acetone cyanohydrin production meets these criteria (i.e., used captively) and will constitute a problem only if there are losses occurring during production.

Toxicity Data Pitfalls

The gathering of data is not always a straightforward process, especially when it is necessary to use secondary sources because of time constraints. The use of secondary sources introduces the possibilities of inaccurate recording and in some cases even two closely related secondary sources do not agree on the information contained in a primary source. This can be best demonstrated with a concrete example. Thus reference 2 (1975) gives the following entry under acetamide:

> TXDS:orl-rat TDLo: 456 gm/kg/52WC TFX:CAR from
> reference TXAPA9 14,163,69.

However, reference 8 gives the following entry under acetamide:

> TXDS:orl-rat TDLo: 360 mg/kg/52W TFX:CAR from reference TXAPA9 14,163,69; the same reference as above.

The question arises as to which one is correct, since they are obviously not equivalent doses.

The reference used in the above examples (23) was consulted and it was found that neither of the indicated doses could be directly confirmed. The dose was indicated in the following way: ". . .administration of 2.5% acetamide in the diet of rats for 12 months led to malignant liver tumors after 12-15 months of observation in approximately 50% of the animals at risk." There is no place in the article that describes how much acetamide "2.5% acetamide in the diet" is. All doses are given in percentage of the diet and the amount of diet consumed by the rats is not indicated. It was then determined that when animal food intake is not specified, it is assumed by NIOSH (reference 2, page xxi) that rats eat 15 gm/day. Based on this assumption and the average weight of the rats over the 52 week study period it can be calculated that 456 gm/kg is the approximate amount of acetamide administered. Thus the datum reported in reference 2 is correct but the datum in reference 8 is grossly inaccurate, indicating that acetamide is a potent hepatic carcinogen in the rat while in fact being a very weak carcinogen.

Data Unavailability

Inaccurate data may be worse than no data, but there is much information that is given in an incomplete form or not available at all. For example, total production figures for many important compounds are not available. Some of these numbers are considered proprietary, others have never been sought, and still others are available only for certain years. The problems with toxicity data are even greater. LD-50 data for oral toxicity in rats are available for approximately 50 percent of the compounds in Table A-1, and this is the most abundant single kind of toxicity data available. The gaps are enormous. It may be that some very hazardous compounds have never been tested.

Some of the toxicity data is subjective or descriptive rather than quantitative. This information can be valuable, but comparisons among different compounds are very difficult with this kind of information.

Tentative Criteria for Use in the Identification and Priority Listing of Hazardous Industrial Organic Chemicals--

The problems mentioned above have a direct bearing on the identification of hazardous compounds. It is necessary to identify which criteria will be used to determine if a compound is hazardous. It is also necessary to establish if one criterion is more important than another.

Various criteria are listed below that might be considered for use in the identification and priority listing of hazardous industrial organic chemicals. These tentative criteria are the result of consideration of several sources of discussions of toxicity data (16) or the potential toxic hazards posed by chemicals (24-27).

I. NATURE OF TOXICITY INFORMATION

A. Testing Protocols Used

1. Chemical delivery

a. Species of animal used
b. Exposure or administration route

(1) oral ingestion
(2) inhalation
(3) skin absorption
(4) parenteral
(5) subcutaneous
(6) other

c. Rate and duration of exposure
d. Level of exposure

2. Kind of toxicity

a. Acute
b. Subacute
c. Chronic

3. Specific toxicity tests

a. Carcinogenic
b. Teratogenic
c. Mutagenic
d. Others

B. Physiological-Toxic Compound Interaction Factors

1. Factors affecting translocation

a. Lipid versus water solubility

(1) partition coefficients
(2) ionization factors

b. Membrane mobility

2. Biotransformation

a. Metabolism

(1) detoxification (metabolism and exretion)
(2) formation of toxic metabolites

    3. Chemical interactions

        a. Synergistic (potentiation) effects
        b. Additive effects
        c. Antagonistic effects

II. COMPOUND PHYSICAL PROPERTIES

A. Volatility

1. Boiling point
2. Vapor pressure

B. Solubility

1. Water
2. Aqueous/organic partition coefficients
3. Lipid (oil)

III. CHEMICAL PRODUCTION FACTORS

A. Production Volume
B. Process Type

1. Continuous
2. Batch
3. Aqueous versus nonaqueous
4. Toxic by-products

C. Process Losses

1. Amount
2. Source type

- a. Continuous
- b. Intermittent (upset conditions, spills, etc)

3. Escape route

- a. Air
- b. Water
- c. Particulates
- d. Solids or sludges

D. Process Controls
E. Waste Disposal Practices
F. Demographic Factors

IV. USES

A. Downstream Production Processes
B. End Products

1. Level of contamination with chemicals
2. Persistence of chemicals in products and in the environment
    a. Loss mode
    b. Loss rate

Admittedly, all of this information is probably not available for even one compound; but even if it were, the task of identifying hazardous industrial organic chemicals would still exist. The task ahead then is to determine which are the most important criteria, whether the criteria will give a yes-no answer, and at what level a substance will be considered hazardous where quantitative data are involved.

Because of the limited amount of data available for any given industrial organic chemical and the poor overlap of different types of data, and the difficult, time-consuming nature of this subtask, it was not possible to choose criteria and set arbitary cutoff values. Further analysis of this problem and the type of information available may provide some criteria in future studies.

SECTION 9

POLLUTION CONTROL TECHNOLOGY

Published EPA studies are concerned with control of effluents or emissions in a general way, with little information available on control of specific compounds. The few exceptions concern some studies on emissions from specific processes (described below). Because of the numerous products/processes involved in the IOC/ODP industries, only a general survey of control technologies was possible. Effluent controls are discussed first, followed by emissions control technology.

EFFLUENT POLLUTION CONTROL TECHNOLOGY

Effluent waste treatment for industrial organic chemical processes can be conceptually divided into three phases: primary, secondary, and tertiary (28).

In primary treatment simple separation procedures include the following:

(1) Screening
(2) Equalization or neutralization
(3) Oil separation
(4) Flotation or flocculation.

Then the sedimentation of dissolved or particulate waterborne wastes can be accomplished by secondary treatments such as the following:

(1) Activated sludge
(2) Extended aeration
(3) Trickling filters
(4) Aerated lagoons
(5) Waste stabilization ponds
(6) Chemical or thermal oxidation.

These treatments convert organic wastes to inactive sediments and waste streams which are innocuous via biological or chemical conversion.

Tertiary treatments can be applied to remove refractory contaminants. These include such treatments as:

(1) Ammonia stripping
(2) Coagulation and precipitation
(3) Filtration and microscreening
(4) Carbon absorption

(5) Disinfection
(6) Electrodialysis
(7) Ion exchange
(8) Reverse osmosis
(9) Evaporation.

Sludges produced from these treatment processes can be treated in a number of ways. However, the treatments generally include the following:

(1) Aerobic stabilization
(2) Anaerobic digestion
(3) Lagooning
(4) Heat treatment.

Also generally usable are dewatering processes such as filter presses, vacuum filters, centrifuges or sand-drying beds.

The most complete assessment of effluent control technologies is contained in a recent report (19) done for the National Commission on Water Quality. The best current technologies for treatment of effluents are summarized as follows:

Activated carbon adsorption
Activated carbon regeneration
Activated sludge
Aerated lagoon
Aeration, biological processes
Aerobic digestion
Clarification
Dissolved air flotation
Equalization/surge storage
Filtration, dual media
Neutralization
Oil separation
Ozonation
Precipitation, coagulation and flocculation
Thickening
Trickle filtration
Vacuum filtration.

Details of the characteristics and efficiencies of these technologies are given in that report, Appendix A, pages A-1 through A-29. Applicability and efficiencies of organic pollutant removal vary widely depending on the chemical/process in question. Thus it is very difficult to specify "best" technologies. However activated sludge and carbon absorption processes appear to be especially attractive and useful technologies.

AIR POLLUTION CONTROL TECHNOLOGY

As early as 1967 reasonably adequate basic air pollution control technology was available to the industrial organic chemical industry. Hearings before the Subcommittee on Air and Water Pollution of the Committee on

Public Works, March 15-18, 1967, delineated the following general controls technologies:

(1) Incinerators - flame and catalytic
(2) Condensation units
(3) Absorption
(4) Tight systems.

The Houdry Division of Air Products and Chemicals Inc. and Monsanto Research Corporation have done the most in depth studies of atmospheric (air) emissions from the petrochemical industry, Houdry under EPA Contract No. 68-02-0255 and Monsanto Research Corporation under Contract No's. 68-02-1320 (Task 17) and 68-02-1874. Issued reports in the Houdry series include a four volume survey of the industry (29-32) and a six volume series (33-38) pinpointing selected high volume organics. The four volume series of reports surveyed 33 distinctly different processes used to produce 27 different petrochemicals chosen, according to the authors, from more than 200 petrochemicals currently in production in the United States. Many of these products are produced by two or more processes that are substantially different with respect to process techniques and source of air emissions. Excluding the polymers studied, the following list of petrochemicals was included in the study.

IOC Item Number	Houdry Compound
3	Acetaldehyde (2 processes)
7	Acetic acid (3 processes)
8DP	Acetic anhydride
17DP	Acrylonitrile
18	Adipic acid
2ADD	Adiponitrile (2 processes)
84	Carbon disulfide
124DP	Cyclohexanone
199	Ethylene
204	Ethylene dichloride (2 processes)
221DP	Ethylene oxide (2 processes)
227DP	Formaldehyde (2 processes)
232DP	Glycerol
243	Hydrogen cyanide
265	Maleic anhydride
--	"Oxo" alcohols and aldehydes
70DP	n-butanol
248DP	isobutanol
223	2-ethyl hexanol
254	isooctanol
128	n-decanol
80	n-butyraldehyde
250	isobutyraldehyde
331DP	Phenol
338DP	Phthalic anhydride (2 processes)

268	Styrene
374DP	Terephthalic acid (includes dimethyl terephthalate)
82ADD (TDI) 62ADD (MDI)	Toluene diisocyanate (includes MDI and PAPI)
403	Vinyl acetate (2 processes)
404	Vinyl chloride

This list includes 23 chemicals, if "oxo" alcohols and adehydes are considered as one, or 29 chemicals using the indicated list of 5 "oxo" alcohols and 2 "oxo" aldehydes, and 32 processes.

A summary listing of pollution control devices found to be used in these very representative processes included the following:

(1) Incinerators (thermal and catalytic)
(2) Flares
(3) Scrubbers (water or organic liquid absorbent)
(4) Bag filters (bag houses)
(5) Cyclones
(6) Electrostatic precipitators.

With the addition of solid adsorption (e.g., charcoal) techniques, these pollution control technologies, although relatively few and inherently rather simple in concept, may be adaptable to control many of the air pollution problems in the industrial organic chemicals industry, when properly designed and utilized. It should be noted that these control technologies are generally utilized as add-on controls. Better results might be realized from in-process modifications, where applicable, or from combinations of in-process changes plus add-on controls.

The Monsanto Source Assessment study (EPA Contract 68-02-1874) resulted in emissions data on at least 85 IOC. These data have been incorporated in the Organic Chemical Producers Data Base Program (12) by Radian Corporation and have also been included in Table A-1. Assessment of control technologies used in the processes represented by these emissions data is not available at this time.

It may be more appropriate to summarize the add-on control methods which may be applicable to the vapor and liquid-phase (droplets) air emissions associated with the synthetic organic chemicals industry differently as follows:

(1) Incineration
(2) Adsorption on solids
(3) Absorption by liquids
(4) Condensation (vapors only)
(5) Other methods.

Incineration

Incineration has been widely used to control hydrocarbon emissions. Three types of combustion are used in incinerators: flame combustion, thermal combustion, and catalytic combustion. In all cases, an auxiliary fuel must be added to support the combustion when dilute gas streams are involved. A special type of incinerator is the waste heat boiler, in which the heat from the combustion is used to generate steam.

Adsorption

Adsorption of vapors or droplets onto a solid such as activated charcoal or a molecular sieve is an attractive emission control method because it permits recovery of the vapors and thus allows for by-product credits.

Absorption

Absorption of vapors or droplets by a liquid reagent is a possible control method. The scrubber effluent has to be treated to separate the liquid reagent, which should be recycled, from the recovered compound in order to avoid secondary pollution problems.

Condensation

Condensation of the vapors by a cooling water condenser and/or refrigeration may be possible, at least as a first stage method, for some of the more concentrated effluent gas streams.

These control methods are designed primarily for volatile organic compounds, but some processes may emit liquid mist or solid particulates of rather high vapor pressure (e.g., naphthalene). The add-on control methods which may be applicable to the liquid- and solid-phase (particulates) air emissions associated with the organic chemicals industry include the following types of equipment:

(1) Inertial separators
(2) Wet collection devices
(3) Baghouses
(4) Electrostatic precipitators
(5) Other collection devices.

Inertial Separators

Inertial separators are the most widely used devices for collecting medium- and coarse-sized particulates. They operate by the principle of imparting centrigual force to the particle to be removed from the carrier gas stream by directing the gas in a circular path or effecting an abrupt change in direction. Inertial separators include cyclones and mechanical centrifugal devices.

Wet Collection Devices

Wet collection devices use a variety of methods to wet the contaminant particles in order to remove them from the gas stream. The particles are removed by contact with a liquid droplet or by impingement of wetted or unwetted particles on collecting surfaces followed by their removal from the surfaces by flushing with a liquid. Types of wet collection devices include venturi scrubbers, mechanical scrubbers, cyclone-type scrubbers, and orifice-type scrubbers.

Baghouses

When high collection efficiency on small particle size is required, the most widely used method consists of separating the dust from the carrier gas by means of a fabric filter. The fabric is usually made into bags of tubular or envelope shape, and the entire structure housing the bags is called a baghouse.

Electrostatic Precipitators

The electrostatic precipitator design is based on passing a dust-laden gas stream through a highly charged electrostatic field which then charges the dust or smoke and causes agglomeration and precipitation of the accumulated particles.

Other Collection Devices

Other particulate-collecting devices with limited application include settling chambers, impingement separators, and panel filters. Settling chambers collect particles with a sufficiently high settling velocity by the action of gravity forces. Impingement separators are usually used to collect mists by inertial impaction. Panel filters, similar to those used in home furnaces, have several important industrial applications including the collection of overspray from paint-spraying operations.

As an example of matching process groups and control approaches for the purpose of identifying specific emission control methods, the advantages and disadvantages of major hydrocarbon control processes are summarized below:

ADVANTAGES AND DISADVANTAGES OF MAJOR
ORGANIC CHEMICAL CONTROL PROCESSES

Process	Advantages	Disadvantages
Adsorption	Can recover organic chemicals; will remove low concentrations of organic chemicals at low temperatures; does not require heat	Limited to low temperatures; limited to low concentrations; must be regenerated with steam or by heating or disposed of; must remove particulates
Direct Flame Incineration	Simple to operate; destroys organics; little maintenance	Emits nitrogen oxides; may require expensive heat recovery equipment; may emit carbon monoxide; generally requires auxiliary fuel (energy expenditure)

Process	Advantages	Disadvantages
Catalytic Incinerators	Smaller than a flame unit; uses less fuel than a direct-flame unit; less nitrogen oxide emissions than a direct-flame unit	Efficiency may decline with time; susceptible to poisons including particulates; requires regular maintenance
Condensation and Scrubbing	Can recover organic chemicals, will also remove particulate matter; conditions stream for other control units	Limited to high-concentration of hydrocarbons; potential disposal problem; requires second control unit

SECTION 10

ORGANIC DYES AND PIGMENTS INDUSTRY

BACKGROUND

No reliable statistics were found on the manufacturing capacities of any of the companies in the U.S. organic dyes and pigments industry. However in 1973, 23 of these companies were listed as making only dyes, 10 were listed as making only pigments and 19 were listed as making both dyes and pigments (15).

INDUSTRY CHARACTERISTICS

The manufacture of dyes and pigments is characterized by the use of a great variety of batch reactions and a wide spectrum of both inorganic and organic materials. The starting materials are usually relatively low molecular weight materials which are built up in the processing to higher molecular weight substances.

Most manufacturers of organic dyes and pigments make a large number of individual products. The demands for individual products may be quite disparate, with the result that a batch of one product might be made only once a week, but batches of another product enjoying a large demand might be made every day. Large inventories of dyes and pigments cannot be economically justified because of the high unit value placed on these substances. Thus, in 1974, the average unit value of all organic dyes and pigments manufactured in the U.S. was $2.44 per pound (10). Consequently the waste effluents from the manufacture of organic dyes and pigments vary greatly in composition on a daily basis. This unavoidable variation creates difficult technical problems especially in coping with the wastewater from dyes and/or pigments plants, and sometimes in dealing with gaseous emissions as well.

HAZARDOUS SUBSTANCES

All the chemicals used as starting materials to make dyes and pigments are listed in Tables A-1, B-1, and B-2 together with correlated toxicity, production process, and a limited amount of waste stream data. Some of these chemicals show high acute or chronic toxicity. Attention should in particular be given to all ODP substances which are either known to be carcinogenic or which are suspected of being carcinogenic. Also of special note are highly toxic heavy metals (especially lead and mercury) which are often associated with dye and pigment production. These should be rigorously excluded from the effluents. Other less toxic heavy metals such as nickel, must be held within established safe limits. Among the organic starting materials the following substances should be given attention as potentially hazardous materials: acenaphthene, acrylonitrile, aniline, benzene, chlorinated hydrocarbons, chlorinated phenols, nitrobenzes, nitrotoluenes, nitrophenols, amines (both aromatic and aliphatic), and *p*-toluenesulfonic acid.

The lists of dye intermediates and dyes (Tables B-2 and B-3 respectively) are very extensive. Very little toxicity data is available on these substances, hence it will be presumed that the following types of chemicals are likely to be hazardous:

- all amino compounds
- nitro-substituted compounds, especially those with one or more solubilizing groups such as $-SO_3H$ or -OH
- all chlorinated compounds, especially those with solubilizing groups such as $-SO_3H$ or -OH.

POLLUTION CONTROLS

Battelle interviewed three industry sources to determine industry's perception of the hazards associated with effluent materials from the manufacture of dyes and pigments. This brief survey indicated that the industry feels it can satisfactorily cope with its pollution problems using existing technology, although some increase in both operating and capital costs will be necessary. No attempt at independent corroboration of this was made because of time constraints.

Careful attention must be given to the regulation of process conditions to avoid accidental emissions of noxious gases such as sulfur dioxide and nitrogen oxide. Personnel must be carefully trained, well-instructed and properly supervised in this connection. When it is necessary to use highly toxic substances such as lead or mercury, the liquid waste effluents must be collected separately for special treatment to prevent contamination of large volumes of aqueous effluents. Thus, one industry source advised Battelle that mercury was still required in some of their processes, but that all the liquid wastes from such processes were segregated, the mercury completely recovered by a proprietary system and recycled to the processes.

Emissions Controls

One industry source indicated that it feels that virtually all gas and vapor emissions from the manufacture of dyes and pigments can be effectively controlled by use of appropriate control equipment such as absorbers, scrubbers, mist eliminators, and filters for the gas streams involved. This industry source informed Battelle that all equipment which would result in gas and vapor emissions had been routinely purchased with the necessary pollution control devices as an integral part of the process equipment itself. No one type of scrubber or filter will serve for all gas and vapor emission problems; hence each piece of process equipment must have an individual pollution control device specifically designed to cope with the problem entailed by that piece of process equipment.

However not all companies making dyes and pigments have installed this type of equipment. Consequently significant emissions of nitrogen oxides, halogen (chlorine and bromine) fumes, volatile organics, and dusts still are associated with many processes.

Effluent Controls

One industry source indicated that his company believes that most wastewater effluent hazards can be effectively controlled (except for the highly toxic heavy metals) by a central treatment facility. An advanced, proprietary water treatment system now being tested in full scale operation at a plant manufacturing disperse dyes has been described to Battelle as being very promising. The system involved differs from that used ordinarily in respect to the employment of carbon absorption beds for primary treatment of the effluent from the plant first enters a large holding reservoir which serves as an "equalization" basin. This reservoir holds a volume of effluent corresponding to about 1.5 days throughout. It serves to even out surges in the varying composition of the plant effluent. The highly acidic effluent (containing mainly sulfuric acid as the mineral acid component) is neutralized with lime. The precipitated calcium sulfate, together with certain heavy metal compounds and some insoluble salts of organic acids is removed in clarifiers. The clear liquid passes then through beds of activated carbon which absorb all colored materials and many polar, high molecular weight organic chemicals as well. The effluent waste has the characteristics, on the average, shown below.

CHARACTERISTICS OF LIQUIED EFFLUENT
FROM CARBON TREATMENT SYSTEMS

Characteristic	Content, ppm
Biological oxygen demand (BOD)	350
Chemical oxygen demand (COD)	1,000
Iron	10
Nickel	1
Copper	2
Lead	1
Zinc	1

The effluent is further treated in the secondary system (activated sludge) of a municipal sewage disposal plant.

The activated carbon beds are periodically regenerated in a furnace. Stack gases from the furnace are passed through an afterburner and the effluent gases scrubbed with water. The scrubbings are passed into the equalization basin and treated along with plant wastewater.

The solid wastes (mainly calcium sulfate and some heavy metal compounds) are disposed of by landfill. Ideally, the calcium sulfate sludge should be efficiently de-watered in high pressure hydraulic filters and sent to a landfill lined with an impermeable (plastic) membrane. Such a landfill should also be equipped with a system for removal and treatment of leachate from the pit (owing to the intrusion of rainwater) to insure that there will be no "secondary" environmental pollution by leaching of this solid waste.

A further environmental pollution problem in the manufacture of dyes with a significant solubility in water is much more difficult to deal with. Such dyes must be precipitated from solution by "salting out". This manufacturing step requires that large amounts of sodium chloride be added to the finished dye in the reactor to precipitate it from solution. The effluent from plants making such products therefore contains large amounts of salt and much larger amounts of colored substances (i.e., dyes) than are encountered in effluents from plants making organic pigments, vat and disperse dyes. Such plants should always be located near the ocean to avoid contamination of fresh water resources (rivers and lakes) with salt.

One other approach to the control of hazardous organic materials in wastewater effluents could be considered. This is the Zimmerman (Zimpro) process, which is used by some municipal sewage disposal plants for sludge disposal. The process depends on the fact that any organic compound can be oxidized, even in aqueous solution, if the solution is heated to a sufficiently high temperature (7, p 112). However such an application of the Zimpro process might be prohibitively expensive because of the low concentration or organic materials (1000 ppm) and the corrosive nature of the inorganic materials present.

SECTION 11

CONCLUSIONS

The following conclusions are warranted based on an analysis of the central data compilations and the data extraction lists produced in this study:

(1) A unique data base useful in the assessment of the toxic hazard potential of industrial organic chemicals (IOC) and organic dyes and pigments (ODP) has been assembled.

(2) The basic compilations, which are master tables of toxicity, production process, waste products, production volume and end use data on 418 IOC, 115 ODP raw materials, 722 ODP intermediates, and 1458 actual dyes and pigments (Tables A-1, B-1, B-2, B-3, and B-3 Addendum, meet an urgent EPA need for convenient, single source availability of detailed correlated data for identifying and selecting groups of compounds for new source performance standards studies, effluent guidelines studies and the like. Also an additional 92 IOC are presented in Table A-2 (IOC Addendum) with some correlated toxicity and production volume data but these addendum IOC were not further analyzed due to time constraints and therefore are not represented in the following conclusions concerning the IOC.

(3) Eighteen extraction tables were assembled based on various simple lists of toxicity data and production volume data. These may be viewed as "priority" lists of compounds that should be given special attention as candidate groups for further study.

(4) Six IOC extraction tables (Tables E-2, E-6, E-7, E-8, E-9, and E-12) and three ODP extraction tables (Tables G-4, G-5, and G-6) were assembled with the chemicals presented in order of quantitative toxicity or production volume data. These can be considered approximate "priority rating" lists.

(5) Six IOC extraction tables (Tables E-1, E-3, E-5, E-10, and E-11) and three ODP extraction tables (Tables G-1, G-2, and G-3) were assembled with the chemicals listed alphabetically. These can be considered "priority" groups or lists.

(6) Use of the 18 "priority rating" and "priority" lists to identify the chemicals that pose the greatest potential hazard must be approached with great care since the randomly collected data upon which the lists are based are essentially non-standard protocol data of unknown accuracy. Because of this, consolidation of the lists into one master "priority rating" list is not possible although one "priority" grouping of all compounds could be assembled.

(7) Four of six EPA priority lists obtained on this study (Tables F-1 through F-4) were considered of primary importance and were compared with eight of the IOC "priority rating" or "priority" lists (Tables E-3 through E-10). The 45 IOC common to the two sets of tables (Table F-5) constitutes a selected group of chemicals for possible further study, with 28 chemicals which show multiple commonality (text page 41) of possible special significance.

(8) More than 100 additional IOC which are not on the four EPA lists but are on the present study "priority rating" or "priority" lists may be equally good candidates for further studies.

(9) Although quantitative toxicity data are available on 80 percent of the IOC, the most prevalent reasonably uniform test protocol data (59 percent of the IOC) that can be listed in order of decreasing toxicity (Table F-6) are LD50, oral-rat. Sixty-four (15 percent of 418 IOC) of the IOC on this list of 245 compounds constitute potential toxic hazards (LD50 ≦ 500 mg/kg).

(10) LD50, oral-animal other than rat data are also available (Table E-7) on another 130 of the IOC, with 16 of these IOC showing LD50, oral data ≤ 500 mg/kg on compounds with no LD50 ≤ 500 mg/kg. This constitutes a ground total of 87 IOC (21 percent of 418) with LD50, oral data ≦ 500 mg/kg.

(11) Inhalation data (LC50, any animal and test protocol, Table E-9) are available on 31 IOC (7.4 percent of 418) with 18 of these compounds (4.3 percent) posing a

potential toxic hazard (LC50 ≦ 1000 ppm or 200 mg/m^3).

(12) Quantitative toxicity data are available on only 16 percent of the ODP intermediates and 3 percent of the dyes and pigments. Consequently the few compounds identified on the ODP "priority" lists must represent a very incomplete set of potential toxic hazards.

(13) The important lists of compounds with animal test data indicating that they are carcinogens (Tables E-4 and G-3) or mutagens or teratogens (Table E-5) are presented in alphabetical order due to the great variation in test protocols used to obtain the data. Nevertheless there are some compounds on these lists that are of greater concern than the rest, including about 29 compounds that are either known human carcinogens, relatively potent test carcinogens (animals) or are both carcinogens and mutagens or teratogens.

(14) Production volume data are available on 163 IOC (39 percent of 418 IOC, Table E-11), with quantitative toxicity data available on 143, or 90 percent, of these. This is a very high degree of commonality.

(15) The 102 highest production volume IOC (≧ 100 x 10^6 lbs/yr) should be given special attention, particularly if they are on one of the toxicity "priority" lists. IOC products with no production volume data (61 percent of 418 IOC) or those few with moderate to high production volumes but no toxicity data, are candidates for additional data searches or toxicity testing.

(16) Production volumes are available on fewer ODP products (20 percent) than on the IOC, with the number of correlated production volume and toxicity data very few (25 items, 1.5 percent, 16 percent commonality).

(17) Quantitative waste product data of uncertain reliability are available on 119 (28.4 percent) of the 418 IOC (none on the ODP), including effluent data on 3.8 percent and emissions data on 24.6 percent.

(18) Ninety-five of the IOC (23 percent) have quantitative end use pattern data, with most of these (about 90 percent commonality) showing quantitative toxicity data.

(19) Definitive criteria for rating toxic hazard potential could not be established but work

should continue on this important task.

(20) A state of the art assessment of pollution control and waste treatment technology led to a determination that most of the published information on these technologies is of a general nature. Due to wide variations in production process technology and in the applicabilities and efficiencies of different techniques for controlling organic effluents or emissions, it was not possible to specify "best" technologies on the present study, given the broad scope of the program and the time and funding available for the task.

(21) Because of the complexity of these industries and the present state of toxicological data availability and understanding, this study should be viewed as a beginning effort.

SECTION 12

RECOMMENDATIONS

An extensive analysis of the master tables of coordinated, comprehensive data on industrial organic chemicals (IOC) and organic dyes and pigments (ODP) and the eighteen tables of extracted data produced using this data base has been carried out. In addition to the results and conclusions summarized in Sections 1 and 11, a number of areas were identified where additional analysis of the presently available data would be fruitful and where new information of potentially great value should be sought. These areas are summarized in the following outline:

FUTURE WORK OUTLINE

1. Computer Storage of Data (Computer Program)
2. Expand Data Base
    - (a) Compounds included
    - (b) Identifying symbols (WLN, Chemical Abstracts)
    - (c) Toxicity data additions - especially common protocol
        - (1) Acute
        - (2) Chronic
    - (d) Process information
        - (1) Update present data
        - (2) Process information on new compound additions
    - (e) Waste products - quantitative data on specific compounds
    - (f) Production volumes
    - (g) Quantitative end use patterns
3. Continue Examination of Present Data Base to Identify New Extraction Modes
4. Continue Comparison of Various Extraction or "Priority" Lists
    - (a) Determine commonality of key data
    - (b) Construct more complex comparison lists
        - (1) Most toxic compounds - acute toxicity data
        - (2) Most toxic compounds - chronic toxicity data

        (3) Highest production volumes
        (4) Quantitative waste product data

5. Continue Attempts to Identify the Most Important Criteria for Determining Toxic Hazard Potential

    (a) Continue analysis of the potential criteria outlined in Section 8
    (b) Evaluate the Ames Bioassay Method
    (c) Determine whether potentially important criteria have been overlooked

6. Continue Search for Pollution Control Technology and Equipment

    (a) Emphasize specific compound/process technology
    (b) General technology advances.

The value of the present data base can be improved by establishing a computer program that would provide rapid access to data on the IOC and ODP with a format that would facilitate data comparisions and allow new data compilation arrangements to be readily assembled for manual study. The Radian computer program (12) developed to accommodate IOC should be amenable to modification to include the new data and IOC contained in the present study. A similar program could be developed to accommodate the ODP entries. The use of the WLN symbols would allow searches or data compilations keyed to specific chemical structures to be accomplished readily. These computer bases would allow more facile comparisons of the present "priority rating", "priority" group and EPA priority lists, to identify commonality. Also compilation of new and more extensive or data inclusive "priority" lists would be accomplished more readily and efficiently. These could include:

- Compounds listed according to decreasing production volume correlated with various specific toxicity data

- Compounds listed in order of toxicity data not yet specifically analyzed (e.g., LD50, animal data obtained by administering the chemical by routes other than oral or inhalation)

- Compounds listed in order of total organics emissions (quantitative data)

- More extensive compilations incorporating multiple data types

More work needs to be done to insure that all the important data outlined above are obtained. Potentially important sources of this information were not utilized on the present study because of time and funding constraints. These include the following:

- Producing companies
    - Product brochures
    - Annual reports
    - Personal contacts

- Industry organizations
    - Published reports
    - Personal contacts

- Primary literature (computer searches of abstract services)
    - Chemical Abstracts
    - Index Medicus
    - Predicasts.

Collection of information by these routes would no doubt be time consuming but they might provide significant amounts of new and important data. Some preliminary work using a few selected search subjects should establish the value of these approaches.

Some additional process data which could be incorporated into the present study are already available in reference 12.

Even without the developmment of a computer program for storage and retrieval of the data base developed on this study, further analysis of the present data is possible. Thus new lists such as those outlined above under computer studies could be manually prepared and used. These efforts would become even more important if new data were obtained by the methods outlined above and added to the data base. Comparison of the newer "priority" lists with each other and with the already available lists should provide further identification of compounds with the greatest toxic hazard potential.

Of course efforts to identify the most important criteria for evaluating toxic hazard potential should be continued. Also further searches for and assessment of pollution control equipment and technology needs to be carried out.

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APPENDIX A

TABLE A-1. INDUSTRIAL ORGANIC CHEMICALS-TOXICITY,

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1 DP	Acenaphthene $C_{12}H_{10}$	000083329 (L 566 1A L T EEJ)	—	Skn and muc mem irr., NEO	—	TDLo:600 gm/kg/YI TFX:NEO skn-mus
2	Acetal (Acetalhyde, diethyl acetal) $CH_3CH(OC_2H_5)_2$	000105577 (20V02)	4600 rat 2582 rbt	LDLO:500 mg/kg orl-hmn Narcotic, based on animal experiments LCLo:4000 ppm/4H,	—	—
3 DP	Acetaldehyde CH_3CHO (C_2H_4O)	000075070 (VH1)	1930 rat	TCLo:134 ppm/30M TFX:IRR, ihl-hmn L irr, CNS narcotic LDLo:500 mg/kg ipr-rat LCLo:4000 ppm/4H, ihl-rat LD50:640 mg/kg, scu-rat LD50:560 mg/kg, scu-mus	USOS air: TWA 100 ppm or 180 mg:m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

PROCESS, WASTE, PRODUCTION AND USE DATA

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Separation (Coal tar, light cycle oils, drip-oils, reformer bottoms)	208	—	—	—	Dye intermediate, intermediate, pharmaceuticals, insecticides, fungicide, plastics	1)507 3)331 6)1
Condensation (Acetaldehyde-ethanol, acid catalyst)	123	**Water:** acetaldehyde, ethanol, acetal, acid or salt catalyst	—	—	Numerous-including automative industry, building industry, packaging, petroleum industry, solvents, cosmetics, organic synthesis, perfumes, flavors, electrical industry, appliance, machines, consumer industry	1)323 2)2 3)331 6)105
Wacker Process, Oxidation (Ethylene, oxygen, air)	84	**Air:** ethane (2.2 kg/Mg), ethylene (27.4 kg/Mg), acetaldehyde, methane,methyl chloride (8.65 kg/Mg). **Water:** discharge 4.4 m^3 (1,200 gallons/ton) containing chlorinated aldehydes, also catalyst metals & acid. See 1)237.	Scrubber vent to flare	657.2/1972	Synthesis: 50% acetic acid and anhydride, 14% n-butanol, 11% 2-ethyl hexanol, 25% misc: peracetic acid, pentaerythritol, pyridines, chloral, 1,3-butylene glycol, trimethylolpropane, thermosetting resins; rubber accelerators & antioxidants, preservative for fruit & fish; in fuels; hardeners	1)236 2)2 3)332 6)601A 7)1-92
Dehydrogenation, oxidation or catalytic (Ethanol)	124	**Air:** CO (12.2 Mg per yr) acetaldehyde, ethanol ethyl acetate. **Water:** 1)326 Plant 1: Flow - 0.0132 m^3/kg product COD - 186 mg/l 2.42 gm/kg BOD - 84 mg/l 1.10 gm/kg Plant 2: Flow - 1.165 m^3/kg product TOC - 14,500 mg/l 16.74 gm/kg	—	Ditto	Ditto	1)324
See acetone	251B	—	—	—	—	1)616

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
4	Acetaldol (Butyraldehyde, 3–Hydroxy-) (Aldol) $CH_3CH(OH)CH_2CHO$ $(C_4H_8O_2)$	000107891 (VH1YQ)	2180 rat	Acute oral LD50:140 mg/kg skn-rat	––	––
5	Acetamide CH_3CONH_2 (C_2H_5NO)	000060355 (ZV1R)	30g/kg rat	Mild irr, low toxicity LD50:10 gm/kg, scu-rat LD50:8300 mg;kg, scu-mus	––	TDLo:456 gm/kg/ 52WC TFX:CAR, orl-rat
6	Acetanilide $CH_3CONHC_6H_5$ (C_8H_9NO)	000103844 (1VMR)	800 rat 1210 mus	LDLo:50 mg/kg orl-hmn Cyanosis, dermatitis LDLo:1000 mg/kg ipr-mus LDLo:500 mg/kg orl-dog	––	––
7	Acetic acid CH_3COOH $(C_2H_4O_2)$	000064197 (QV1)	3310 rat 4960 mus LDLo: 1200 rbt	TDLo:816 ppm/3M, ihl-hmn, TFX:IRR Burns, lacrymations, conjunctivitis, dermatitis LC50:5620 ppm/1H ihl-mus	USOS air: TWA 10 ppm	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Condensation (Acetaldehyde, dilute alkali)	85	**Water:** acetaldehyde, acetaldol, NaOH	—	—	Rubber accelerators; age resistors; synthesis; perfumery; engraving; ore flotation; solvent; solvent mixture for cellulose acetate; fungicides; organic synthesis; printer's rollers; cadmium plating; dyes; drugs; dyeing assistant; synthetic polymers	1)240 2)255 3)346
Ammonolysis (Ethyl acetate, aqueous ammonia	128	**Air & Water:** reactants & products	—	—	Organic synthesis (reactant, solvent, peroxide stabilizer); general solvent; lacquer; explosives; soldering flux; hygroscopic agent; wetting agent, penetrating agent	1)334 2)3 3)332 8)1
Acetylation (Aniline, acetic acid, benzene (solv)	17	Benzene	—	1.8/1973	Rubber accelerator; inhibitor in hydrogen peroxide; stabilizer for cellulose ester coatings; synthesis of intermediates (para-nitroaniline, para-nitroacetanilide, parahexylenediamine); synthetic camphor; pharmaceutical chemicals; dyestuffs; precursor in pencillin synthesis, medicine (antiseptic)	1)79 2)9 3)332
Oxidation (Acetaldehyde, ethyl acetate, air	101	**Air:** Methane 1.8 g/kg, CO - 3.3 g/kg **Water:** Organics 15 g/l, see 6:273 Plant 1: Flow - 4.17 m^3/kg COD - 186 mg/l 0.78 gm/kg BOD_5 - 84 mg/l 0.35 gm/kg Plant 2: Flow - 0.085 m^3/kg COD - 306,100 mg/l 26.18 gm/kg BOD_5 - 64,000 mg/l 5.44 gm/kg	—	1104/1973 1033.7/1974 954/1975 1278/1978	Synthesis: 40% vinyl acetate, 23% cellulose acetate, 12% acetate esters, 10% TPA/DMT, 3% textile processing 2.5% chloroacetic acid, 9.5% misc: pharmaceuticals; dyes; insecticides, photochemicals, etc.; food additive (as vinegar); natural latex coagulant; oil-well acidizer; textile printing	1)272 2)212 3)333 6)601A 11)36

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	Acetic acid	See item above	See item above	See item above	See item above	—
8 DP	Acetic anhydride $(CH_3CO)_2O$ $(C_4H_6O_3)$	000108247 (1VOV1)	1780 rat	Irr, corrosive to eyes & upper respiratory tract. Dermatitis on continued contact with skn LCLo:1000 ppm/4H, ihl-rat LD50:4000 mg/kg, skn-rbt	USOS air: TWA 5 ppm or 20 mg/m^3	—
	Ditto	Ditto	Ditto		Ditto	—
9 DP	Acetone CH_3COCH_3 (C_3H_6O)	000067641 (1V1)	5300 rbt LDLo: 8000 dog 9750 rat	LDL_o:50 mg/kg orl-hmn TCLo:500 ppm TFX: eye, ihl-hmn TCLo:12,000 ppm/4H TFX:CNS, ihl-hmn Narcotic in high concen	USOS air: TWA 100 ppm or 2400 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/mg	Uses	References
Carbonylation (methanol, carbon monoxide)	201	Air: hydrogen (5.5 kg/Mg), CO (294 kg/Mg), methane (12.7 kg/Mg) Water: 40 kg of waste (50% propionic & 50% higher org)/Mg (200 dm^3/Mg total)	Off-gas scrubber vent	See item above	See item above	1)497
See acetic acid	101	See acetic acid	—	758.2/1973 651/1975 682/1978	95% cellulose acetate fibers & plastics; vinyl acetate; dehydrating & acetylating agent in production of pharmaceuticals, dyes, perfumes, explosives, etc.; aspirin	1)6-272 2)27 3)333 5)559 13)27
Pyrolysis (acetic acid, ketene)	105	Air: methane, ethylene & ketene Water: sodium hydroxide & sodium acetate	Normally burned also gas scrubber system Heavy ends also burned		Ditto	1)285 6)601A 11)36
Oxidation and Cleavage, Peroxidation (cumene, air, hydrogen, sodium carbonate, sodium hydroxide, sulfuric acid. 62% synthetic acetone (563 mm kg) produced by this process in 1973)	37	Most water is recycled, scrub water contains: cumene (trace); acetone	Sludge is incinerated	904/1973 900/1974 723/1975	Synthesis: 25% methyl methacrylate, 14% methyl isobutylketone 10% coatings solvent 6% pharmaceuticals, 5% chemical processing solvent, 4.7% bisphenol A, 4.7% cellulose acetate spinning solvent, 2.6% hexylene glycol, 2.5% diacetone alcohol, 2.3% methyl isobutyl carbinol, 1.8% isophorone, 0.6% mesityl oxide, misc.; to clean & dry parts of precision equipment; solvent for potassium iodide & permanganate; delusterant for cellulose acetate fibers	1)122 2)30 3)334 5)559 6)601B 11)36 13)27

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	Acetone	See item above	See item above	See item above	See item above	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
10	Acetone cyanohydrin (Lactontrile, 2-methyl) CH_3COGH_3HCN (C_4H_7NO)	000075865 (QXCN)	17 rat 3 mus 14 rbt 9 gpg	LCLo:63 ppm/4H, ihl-rat LDLo:8.5 mg/kg scu-rat LC50:575 ppm/2H, ihl-mus LD50:17 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (n-butane)	227	Air: hydrocarbon gases Water: acetic acid and a variety of alcohols aldehydes, ketones, esters, other organic acids and ethers	——	See item above	See item above	1)560
Hydrogen transfer (Acrolein, 2-propanol)	251B	——	——	Ditto	Ditto	1)616
Oxidation - Dehydrogenation (2-propanol)	269	Water: Flow - 1.46 m^3/Mg - product COD - 1.1 kg/Mg BOD - 3.25 kg/Mg TOC - 0.35 kg/Mg	Absorber	Ditto	Ditto	1)649
Oxidation Dehydrogenation (2-propanol, air)	270	——	——	Ditto	Ditto	1)651
Cleavage (Cumene hydroperoxide, sulfuric acid)	295 (see also 37)	Water: acetone (0.46 kg/Mg), phenol (0.08 kg/Mg phenol), mesityl oxide (19.9 kg/Mg phenol) Air: hydrogen (15 g/Mg phenol), CO (20 g/Mg phenol), phenol (1.48 kg/Mg)	——	Ditto	Ditto	1)695
Addition Condensation (Acetone, hydrogen cyanide)	170	Emission factors: HCN - 1.0, acetone - 1.0	——	245.2/1969	Synthesis: 83% methyl methacrylate, 17% higher methacrylates	1)431 2)674 3)335 12) 13)27

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
11	Acetonitrile (methyl cyanide) CH_3CN (C_2H_3N)	000075058 (NC1)	3800 rat	Highly toxic (cyanide) LCLo:8000 ppm/ 4H, ihl-rat LD50:500 mg/kg, ipr-mus LDLo:700 mg/kg scu-mus LDLo:130 mg/kg scu-rbt	USOS air: TWA 40 ppm or 70 mg/m^3	—
12	Acetophenone (Phenyl methyl $CH_3COC_6H_5$ (C_8H_8O)	000098862 (1VR)	900 rat (Ref 2) 300 rat (Ref 4)	Narcotic in high concen; hypnotic; LDLo: 200 mg/kg, ipr-mus	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
13	Acetylene $H \equiv CH$ (C_2H_2)	025067587 (1UU1)	—	20% concen may cause dyspneca & headache in hmns; 40% may cause collapse. 900,000 ppm in air, lethal for rats	—	—
14	Acrolein CH_2CHCHO (C_3H_4O)	000107028 (VH1U1)	46 rat 7 rbt	LDLo:5 mg:kg orl-hmn TCLo:1 ppm TFX-IRR, ihl-man LCLo:153 ppm/ 10M, ihl-hmn Lachrymator; irr to eyes & respiratory tract	USOS air: TWA 0.1 ppm or 0.25 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ammoxidation (propylene, air ammonia, sulfuric acid)	273	Air: acrylonitrile (5 kg/Mg product), CO (200 kg/Mg), propane (50 kg/Mg), propylene (100 kg/Mg), HCN (1 kg/Mg product) Water: ammonium sulfate, acetonitrile	Absorber off-gases to flare	68.1/1973	Solvent in hydrocarbon processes, especially for butadiene; specialty solvent; intermediate, separation of fatty acids from vegetable oils; manufacture of synthetic pharmaceuticals	1)656 2)30 3)814 5)559 12)
Oxidation (ethylbenzene, air, sodium hydroxide, manganese acetate)	2	Air: ethylbenzene, acetophenone, α-phenylethyl alcohol Water: sodium salts of byproduct acids, sodium hydroxide, ethylbenzene, acetophenone, α-phenylethyl alcohol	—	1.0/1973 1.22/1974	Perfumery; solvent intermediate for pharmaceuticals, resins, etc.; flavoring	1)49 2)32 3)905 4)8 12)
See acetone above	37	See acetone above	See acetone above	See acetone above	Ditto	1)122
Pyrolysis, BASF process (Methane-oxygen)	173	Air: hydrocarbon from feedstocks, carbon particulates from incomplete combustion Water: Flow - 0.0047 m^3/kg COD - 1,274 mg/l 5.95 gm/kg BOD_5 - 410 mg/l 1.92 gm/kg TOC - 393 mg/l 1.80 g/kg	Electrostatic units, water scrubbers, moving coke beds & bag filters	230.2/1974 (chemical & non-chemical use)	Synthesis: 33% vinyl chloride & vinylidene chloride; 26% acrylates; 17% vinyl acetate; 20% acetaldehyde, neoprene, acrylonitrile, trichloroethylene, cyclooctatetraene; tetrahydrofuran; carbon black misc; also welding & cutting metals	1)437 4)11 3)338 7)1-203 13)28
Oxidation (Propylene, oxygen, cuprous oxide cat)	250	Air: propylene (71 kg/Mg), propane (3.5 kg/Mg), CO (73.5 kg/Mg)	Propylene absorber off-gas	28.0/1974	Methionine (chicken & dog food fortifiers). Intermediate for synthetic glycerol, polyurethane, polyester resins, pharmaceuticals; herbicides; tear gas	1)614 2)47 3)342 5)559 10) 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
14 (Continued)				LCLo:8 ppm/4H ihl-rat LCLo:1570 mg/m^3/8H ihl-cat LCLo:24 mg/m^3/6H ihl-rbt LD_{50}:562 mg/kg skn-rbt		
15	Acrylamide $CH_2CHCONH_2$ (C_3H_5NO)	000079061 (ZV1U1)	170 mus LDLo:126 LDLo:252	Absorbs through unbroken skn; CNS paralysis in animals LDLo:126 orl-rbt LDLo:252 mg, orl-gpg LDLo:1000 mg/kg, skn-rbt	USOS air: 0.3 mg/m^3 (skn)	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
16	Acrylic acid CH_2H_3COOH ($C_3H_4O_2$)	000079107 (QV1U1)	340 rat	LCLo:6000 ppm/5H, ihl-rat LDLo:128 mg/kg, ipr-mus LD50%280 mg/kg, skn-rbt	—	—
17 DP	Acrylonitrile CH_2CHCN (C_3H_3N)	000107131 (NC1U1)	93 rat 82 rat 93 rbt	TDLo:16 ppm/20M, TFX:PUL, ihl-man High toxicity: little evidence of accumulation LC50:576 ppm/4H, ihl-gpg LD50:280 mg/kg skn-rbt LCLo:500 ppm/4H, ihl-rat	USOS air: TWA 2 ppm (skn) or 4.3 mg/m^3, 10 ppm (skn, 15 min)	Human Carcinogen TCLo:80 ppm/6H/52W TFX:NEO, ihl-rat TDLo:1700 mg/kg/37WC TFX:NEO, orl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Hydration (Acrylonitrile, conc sulfuric acid, ammonia or sodium hydroxide)	274A	**Water:** acrylic acid, acrylonitrile, ammonia, sodium hydroxide, sulfates, acrylamide	—	18.2/1973	Synthesis of dyes, etc.; polymers or copolymers as plastics, adhesives, paper & textile sizes soil conditioning agent; flocculants; sewage & waste treatment; ore processing; permanent press fabric	1)659 2)48 3)342
Direct hydroation over catalysts (Acrylonitrile, water, Cu and Cr oxide catalysts)	274B	**Water:** some acrylonitrile acrylamide and N-nitroso-N-phenyl hydroxylamine inhibitor	—	Ditto	Ditto	1)660
Oxidation (Propylene, air)	276	**Air: kg/Mg** acetone (0.35), acrolein (1.85), ethyl acetate (38.7), propylene (6.25), CO (502) **Water: kg/Mg** acrylic acid (10), polymers (20.6), hydroquinone (10.65), acetic acid (35.7), & ethyl acetate (27.25)	Solvent recovery column	59.7/1973 431/1974	Synthesis: 20% ethyl and methyl acrylates, 6.8% n-butyl & isobutyl acrylates, 6.8% 2-ethyl hexyl & other acrylates; plastics; paper; paints & coatings; flocculants	1)663 2)48 3)343 6)604 7)1-311 12) 13)28
(See Acetonitrile above)	273	(see Acetonitrile)	—	614.8/1973 642/1974 552/1975	Manufacture: 55% acrylic & modacrylic fibers & high strength whiskers; 20% ABS & SAN copolymers; 5% nitrile rubber; cyanoethylation of cotton; synthetic soil blocks (acrylonitrile polymerized in wood pulp); organic synthesis; grain fumigant	1)656 2)50 3)343 5)559 6)606A 11)36 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
17 DP	(Continued)			LC100:784 ppm/1H, ihl-mus LCLo:120 mg/kg/4H, ihl-dog LCLo:600 ppm/4H, ihl-cat		
18	Adipic acid $COOH(CH_2)_4COOH$ $(C_6H_{10}O_4)$	000124049 (QV4VQ)	1900 mus LDLo:3600 rat	Low toxicity, based on limited animal studies LDLo:3600 rat LD50:275 mg/kg ipr-rat	—	—
19	Allyl alcohol CH_2CHCH_2OH (C_3H_6O)	000107186 (Q2U1)	54 rat 96 mus LCLo:43 dog LDLo:53 rbt	LDLo:50 mg/kg orl-hmn TCLo:25 ppm, TFX:IRR, ihl-hmn Irr to skn, eyes, respiratory tract; kidney & liver damage LC50:165 ppm/44 inh-rat	USOS air: TWA 2 ppm (skn) or 5 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (Cyclohexane, air, catalyst, nitric acid)	45	**Air:** nitrous oxides & nitrogen dioxides, particulates **Water:** metallic catalyst residues, byproduct org acids **Emission factors:** NO_2 - 12.0, particulates - 1.8	—	711/1973 754/1974 668/1975	Manufacture: 90% nylon fibers & resins, 4% urethane foams; 5% esters for use as plasticizers & lubricants; 0.5% ingredient of foods, as acidulant; insecticides; adhesives; tanning; textile printing; fauna inhibitor; coatings; detergents; elastomers	1)140 2)54 3)344 6)606B 7)1-414 11)36 12) 13)28
Hydrogen transfer (Acrolein, 2-butanol)	251A	**Emission factors:** hydrocarbons - 3.0 **Water:** acrolein (12.5) methyl/ethyl ketone (12.5), 2-butanol (7.5), allyl alcohol (5), polymer (53.5), & aluminum hydroxide (82)	—	—	Esters for use in resins & plasticizers; intermediate for pharmaceuticals & other organic chemicals; manufacture of glycerol & acrolein; military poison gas; herbicide	1)616 2)58 3)348 5)559 12)
Dehydration (Propylene glycol, catalyst)	(see 289)	—	—	—	Ditto	1)687
Isomerization (Propylene oxide)	289	**Water: kg/Mg** allyl alcohol (13), terphenyls (12.5), Liphosphate (5), tars (25.5), traces xylene, propyl alcohol	—	—	Ditto	1)687
Substitution Saponification (Allyl chloride, dilute sodium hydride & diethyl ether)	317	**Water:** allyl chloride, allyl alcohol, diallyl ether	—	—	Ditto	1)738

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
20	Allyl chloride (Propene, 3-Chloro-) CH_2CHCH_2CL (C_3H_5CL)	000107051 (G2U1)	64 rat	LCLo:3000 ppm ihl-hmn Eye & mucous mem. irr. local vasc. constriction & numbness; rapid body distress LCLo:290 ppm/8H, ihl-rat LD50:7.15 mg/kg ivn-dog LDLo:500 mg/kg, ipr-mus	USOS air: TWA 1 ppm or 3 mg/m^3	—
21G	Aminobenzoic acids (3 isomers) o-Aminobenzoic acid - see 35	—	—	—	—	—
21 DP	m-Amiobenzoic acid (Benzoic acid, m-Amino-) $NH_2C_6H_4COOH$ $(C_7H_7NO_2)$	000099058 (ZR CVQ)	—	—	—	TDLo:8400 mg/kg/ 84 DI TFX:NEO, orl-rat
22 DP	p-Amino-benzoic acid	000150130 (ZR DVQ)	2850 mus 1830 rbt	LDLo:[illegible] mg/kg orl-hmn Large oral doses; nausea, skn rash, LD50:200 mg/kg ivn-rbt	—	—
23	Aminoethylethanol amine [Ethanol, 2-(1,2-amino-ethyl)amino)-], (2-hydroxyethyl) ethylene diamine] $NH_2CH_2CH_2NHCH_2CH_2OH$ $(C_4H_{12}N_2O)$	000111411 (Z2M2Q)	3000 rat	Moderately toxic, orl and skn LD50:1800 mg/kg, skn-gpg	—	—
24G	Amyl acetates (8 isomers)	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Chlorination (Propylene, chlorine)	315	**Air: kg/Mg** proplylene (13.5), ethyl chloride (13.5) **Water:** sodium hydroxide **Emission factors:** same as air	Absorber	395.4/1970	Synthesis: allyl alcohol & other derivatives; thermosetting resins for varnishes, plastics, adhesives; synthesis of pharmaceuticals; glycerol & insecticide	1)734 2)764 3)349 5)559 12
--	--	--	--	--	--	--
Reduction (m-, p-nitrobenzoic acid, catalyst, hydrogen)	330	--	--	--	Dyes; drugs; perfumes; pharmaceutical; dye intermediate	1)768 2)180 3)358 4)53
--	--	--	--	--	--	2)180 3)358
Alkylation (Ethylenediamine and ethylene chlorohydrin or ethylene oxide)	135	**Water:** Some HCl, polymers	Scrubber	6.1/1974	Textile finishing compounds (antifuming agent, dyestuffs, cationic surfacants; resins, rubber products, insecticides & certain medicinals	1)356 2)400 3)359 12)
Esterification (Amyl alcohols, acetic acid)	54	**Air & Water:** acetic acid, amyl alcohol, amyl acetate, sulfuric acid **Emission factors:** hydrocarbons - 2.0	--	5.4	Solvent for lacquers & paints; extraction of penicillin; photo film; leather polishes; nail polish; warning odor; flavoring agent; printing & finishing fabrics; solvent for phosphors in fluorescent lamps	1)161 2)31 3)373 5)559 6)608 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
24	(n-Pentylacetate) $CH_3COO(CH_2)_4CH_3$ $(C_7H_{14}O_2)$	000628637 (50V1)	7400 rbt	TCLo:5000 mg/m^3/ 30 M TFX:IRR, ihl-hmn TCLo:188 ppm/30M, TFX:IRR, ihl-hmn Low chronic toxicity; irr to muc mem; narcotic LCLo:5200 ppm, ihl-rat LDLo:1500 mg/g, ipr-rat	USOS air: TWA 100 ppm or 525 mg/m^3	—
25	sec-Amyl acetate (Acetic acid, 2-pentyl ester)	—	—	TLCo:200 ppm ihl-hmn	USOS air: TWA 125 ppm or 650 mg/m^3	—
26G	Amyl alcohols (8 isomers)	—	—	—	—	—
26	(n-Pentyl alcohol) $CH_3CH_2CH_2CH_2CH_2OH$ $(C_5H_{12}O)$	000071410 (Q5)	3030 rat 200 mus	LDLo:500 mg/kg orl-hmn Possible eye & upper respiratory tract irr LDLo:490 mg/kg, ipr-rat	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
	Isoamyl alcohol, see 245					
27G	Amylamines (8 isomers)	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Esterification (Amyl alcohols, acetic acid)	54	See item above	—	5.4	See item above	See Item above
——	——	——	——	——	—	3)373
Oxo process (Mixed butylenes: 1-butene, 2-butene, methylpropene; CO, H_2)	53	**Air:** CO, butylenes & alcohols, dimers	Incineration, off gases to flare	——	Solvent; material for pharmaceutical preparation; organic synthesis; lubricants; plasticizers; additives for oils & paints; flotation agent; medicine	1)159 2)624 3) 5)561
Ditto	Ditto	Ditto	Ditto	——	Ditto	Ditto
Substitution Hydrolysis (Mixed amyl chlorides, sodium hydroxide	244	**Water:** NaOH, NaCl,amyl alcohols, amyl chlorides, pentylenes & amyl ether	——	——	Ditto	1)542 2)242
Amination Ammonolysis (Amyl chloride, ammonia)	243	**Air:** amyl chloride, ammonia, amyl amin amines **Water:** ammonium chloride, heavy org	——	——	Chemical intermediate; dyestuffs, rubber chemical; insecticide; synthetic detergents, flotation agent; corrosion inhibitor; solvent gasoline additive; pharmaceutical	1)590 2)624 3)374

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
27	(n-Pentylamine) $CH_3(CH_2)_4NH_2$ $(C_5H_{13}N)$	000110587 (Z5)	470 rat	Strong irr LD50:1120 mg/kg skn-rbt LCLo:2000 ppm/ 4H, ihl-rat	—	—
28G	Amyl chlorides (8 isomers)	—	—	—	—	—
28	Amyl chloride (Pentane, 1-Chloro-) $C_5H_{11}N)$	000543599 (G5)	—	Unknown	—	—
29	Amyl mercaptans (1-Pentanethiol) $CH_3(CH_2)_4SH$ $(C_5H_{12}S)$	000110667 (SH5)	—	LCLo:2000 ppm/ 4H, ihl-rat	—	—
	Amylenes (see 324-326)	—	—	—	—	—
30 DP	Aniline $C_6H_5NH_2$ (C_6H_7N)	000062533 (ZR)	440 rat LDLo:1750 cat	LDLo:350 mg/kg orl-hmn Forms methemolobin, anoxemia, depression of CNS, contact dermatitis; possible blood pressure lowering & cardiac arrythmia LD50:64 mg/kg ivn-rbt LD50:1400 mg/kg skn-rat LC50:250 ppm ihl-rat	USOS air: TWA 5 ppm (skn) or 19 mg/m^3 (skn)	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See item above	243	See item above	––	––	See item above	See item above
Chlorination (Pentane, isopentane, chlorine)	242	Air: HCl, Cl_2, pentanes, various C_5 chlorohydrocarbons	––	––	Synthesis of other amyl compounds; solvent; rotogravure ink vehicles; soil fumigation	1)588 2)839 3)375
Ditto	242	Ditto	––	––	Ditto	Ditto
Substitution, Hydrosulfation (Amylchloride, sodium or potassium hydrosulfide, alcohol solvent)	245	**Water:** sodium or potassium chloride, amyl chloride, amyl mercaptans, sodium or potassium hydrosulfide, alcohol solvent; diamyl sulfide	––	––	Synthesis of organic sulfur compounds; chief constituent of odorant used in gas	1)594 2)840 3)376
Amination (Chlorobenzene, liquid ammonia, cuprous oxide)	9	**Emission factor:** (Process 24) aniline 0.4, nitrobenzene - 0.3, ammonia - 0.3	––	208/1973 250/1974 187/1975 276/1978	Synthesis: 40% isocyanates (MDI & PAPPI), 35% rubber accelerators & antioxidants, 6% dyes & intermediates, 6% hydroquinone, 4% pharmaceuticals; explosives; petroleum refining; diphenylamine; phenolics; herbicides; fungicides; textiles, paper & metallurgical industry; catalysts; stabilizers	1)66 2)105 3)379 4)85 5)559 6)608 11)36 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	See item above	See item above	See item above	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
31	Aniline hydrochloride (Benzenamine Hydrochloride) $C_6H_5NH_2HCl$ (C_6H_8C1N)	000142041 (ZR & GH)	1072 rat 841 mus	See aniline LDLo:500 mg/kg, ipr-rat LD50:750 mg/kg, ipr-mus	—	—
32	p-Anisidine $CH_3OC_6H_4NH_2$ (C_7H_9NO)	000104940 (ZR D01)	1400 rat	Contact dermatitis, see aniline LD50: 1400 mg/kg, ipr-rat	USOS air: 0.1 ppm (skn) or TWA 0.5 mg/m^3 skn)	—
33	o-Anisidine $CH_3OC_6H_4NH_2$ (C_7H_9NO)	000090040 (ZR B01)		See Aniline	—	—
34	Anisole $C_6H_5OCH_3$ (C_7H_8O)	000100663 (1OR)	3700 rat 2800 mus	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction (Nitrobenzene, hydrogen, catalyst)	31	Water: Flow - 1.58 l/kg COD - 13,400 mg/l 27.2 g/kg BOD$_5$ - 15 mg/l 0.02 g/kg TOC - 12,150 mg/l 19.2 g/mg	—	See item above	See item above	1)109 7)2-419
Ammonolysis (Phenol, ammonia, catalyst)	300	Air: H_2, N_2, ammonia, phenol, aniline	Heavies incinerated, waste disposal problems considered minimal by this process	Ditto	Ditto	1)709
Salt formation, hydrochlorination (Aniline, hydrogen chloride)	33	Air: HCl, ether (solvent)	—	—	Dyes; intermediates; dyeing & printing; aniline black	1)114 2)156 3)380
Reduction (o-, p-nitroanisole, hydrochloric acid, tin or iron filings)	310	Water: iron or tin salts or org	—	—	Intermediate for azo dyes & for guaiacol	1)727 2)101 3)381
Ditto	310	Ditto	—	0.9/1973	Ditto	Ditto
Methylation, Substitution (Sodium phenate, (sodium phenoxide) methyl chloride)	302A	Water: NaCl, NaOH, phenol, sodium phenate, methyl chloride, anisole Air: methyl chloride	—	—	Solvent; perfumery; vermicide; intermediate	1)712 2)102 3)381

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	See item above	—	—	—
35 DP	Anthranilic acid $C_6H_4(NH_2)COOH$	000118923 (ZR BVQ)	4620 rat	Unknown	—	TDLo:16 gm/kg/ 24WI, TFX:NEO, orl-rat
36	Anthraquinone $C_6H_4(CO)_2C_6H_4$ $(C_{14}H_8O_2)$	000084651 (L C666 BV 1VJ)	—	Local sensitizer; contact dermatitis	—	TDLo:90 mg/kg/ 90DC TFX:NEO, orl-rat TDLo:72 gm/kg/ 90D, TFX:NEO, orl-rat
37 DP	Benzaldehyde C_6H_5CHO (C_7H_6O)	000100527 (VHR)	28 mus 1300 rat 1000 gpg	LDLo:500 mg/kg orl-hmn CNS depression in small doses; convulsions in larger doses; contact dermatitis LDLo:5000 mg/kg ipr-mus	—	—
38	Benzamide $C_6H_5CONH_2$ (C_7H_7NO)	000055210 (ZVR)	1160 mus	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Methylation, Substitution (Phenol, sodium hydroxide, dimethyl sulfate)	302B	**Water:** sodium sulfate, sodium phenate, sodium hydroxide, phenol, anisole, dimethyl sulfate	—	—	See item above	1)712
Hydrolysis & Hofmann Reaction (Phthalimide, sodium hydroxide, chlorine or bromine, hydrochloric acid)	226	**Water:** NaCl or NaBr, phthalimide, anthranilic acid **Air:** chlorine or bromine	—	—	Dyes; drugs; perfumes & pharmaceuticals	1)553 2)103 3)382
Condensation - solvent Condensation - ball mill (Phthalic anhydride, benzene, $AlCl_3$, sulfuric acid, sodium carbonate, sodium hydroxide)	223 224	**Water:** NaCl, NaOH, aluminum salts, sulfuric acid, benzene, phthalic anhydride, o-benzoylbenzoic acid	Condenser/ scrubber	—	Intermediate for dyes; organic synthesis; organic inhibitors; bird repellent for seeds	1)546 1)549 2)103 3)382 8)31
Oxidation (toluene, air, catalyst)	353	**Air:** CO, CO_2 **Water:** benzoic acid, maleic anhydride, anthraquinone	Scrubber	—	Organic synthesis (especially of dyes & dye intermediates); solvent for oils, resins, some cellulose ethers, cellulose acetate & nitrate;flavoring compounds; synthetic perfumes; manufacture of cinnamic acid, benzoic acid; pharmaceuticals & soaps; photo chemicals; baking chemicals; insecticides; medicine; herbicides; corrosion inhibitors	1)811 2)143 3)402 7)3-363
Ammonolysis (Benzoyl chloride ammonia)	337	**Air:** NH_3, HCl **Water:** NH_4Cl, NH_3, HCl, benzoic acid	—	—	Organic synthesis	1)780 2)145

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
39	Benzene (C_6H_6)	000071432 (R)	5700 rat (Ref 4)128) 3800 rat (Ref 2)156) 4700 mus LDLo:2000 dog	LCLo:20000 ppm/ 5M, ihl-hmn TCLo:210 ppm TFX-BLD, ihl-hmn Erythmia, burning, edema & blistering; narcotic to CNS; anesthetic; acute chronic effects LC50:10,000 ppm/ 7H, ihl-rat	JSOS air:TWA 10 ppm or 30 mg/m^3, new USOS TWA: 1 ppm, 3 mg/m^3 (8 hr), 5 ppm (15 min), under court ordered suspension as of 6/79	Human leukemogen TCLo:2100 mg/m^3/ 4YI , ihl-man TFX:CAR TDLo:1232 mg/kg/ 52W TFX:CAR, skn-mus
40G	Benzenedisulfonic acid 1,2-$C_6H_4(SO_3H)_2$ 2 H_2O	(WSQR XQSW)	—	Severe irritant to eyes, skin, and mucous membranes	—	—
40	1,2-Benzenedisulfonic acid ($C_6H_6O_6S_2$)	(WSQR BQSW)	—	Ditto	—	—
41 DP	Benzenesulfonic acid $C_6H_5SO_3H$ ($C_6H_6O_3S$)	000098113 (WSQR)	890 rat 75 bdw	High orl and ihl acute toxicity	—	—
42	Benzil $(C_6H_5CO)_2$ ($C_{14}H_{10}O_2$)	000134816 (RVVR)	2710 rat	Unknown	—	—
43	Benzilic acid $(C_6H_5)_2C(OH)CO_2H$ ($C_{14}H_{12}O_3$)	000076937 (QXR&R&VQ)	—	Unknown	—	—
44 DP	Benzoic acid $C_6H_5CO_2H$ ($C_7H_6O_2$)	000065850 (QVR)	3040 rat 2370 mus	LDLo:500 mg/kg orl-hmn TDLo:6 mg/kg TFX:SKN, skn-hmn LD50:1460 mg/kg, ipr-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Transalkylation (toluene, hydrogen, C_8 aromatics, alkyl-benzenes	349	By product formation: 29 kg/Mg as C_9 aromatic hydrocarbons, diphenyl, lighter olefins & paraffins	––	5130/1973 4587/1974 3482/1975 5059/1978	Synthesis: 48% styrene, 20% phenol, 17% cyclohexane for nylon, 5% nitrobenzene, 3% maleic anhydride, 2% dodecylbenzene, dichlorobenzene, benzene hexachloride, diphenyl, insecticides, fumigants; solvent; paint removers; rubber cement; antiknock gasoline	1)803 2)156 3)403 4)128 7)3-396 8)51 11)36 13)29
Sulfonation (benzene sulfonic acid; 65% oleum; m-benzene disulfonic acid; catalyst)	22	––	––	––	––	1)91 3)404
Ditto	Ditto	––	––	––	––	Ditto
Sulfonation (benzene; sulfuric acid or oleum or sulfur trioxide)	21	Air: benzene vapors from leaks in system	––	––	Phenol; recorcinol; organic synthesis; polymerization; catalyst; dye intermediate	1)87 2)163 3)442 7)3-405
Oxidation (benzoin; $CuSO_4$, pyridine; acetic acid; HNO_3)	355	Water: pyridine, acetic acid, $CuSO_4$, HNO_3, bensil, benzoin Air: pyridine	––	––	Organic synthesis; insecticide	1)815 2)168 3)406
Rearrangement (benzil, sodium hydroxide, hydrochloric acid)	356	Water: sodium hydroxide, hydrochloric acid	––	––	Chemical intermediate; pharmaceutical	1)817 3)406 7)3-149
Oxidation (toluene, air, cobalt toluate, bromine)	325	Air: benzaldehyde, toluene Water: benzoic acid **Emission factors:** toluene - 3.0, benzoic acid - 1.0	––	36.8/1974	Synthesis: 31% plasticizers, 25% sodium & benzyl benzoates, 22% benzoyl chloride, 7% butyl benzoate, 5% alkyd resins; vulcanization retarder; food preservative; seasoning	1)760 2)179 3)406 6)611 7)3-428 12) 13)29

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
44 DP	(Continued)					
	Benzoic acid, amino (see 22)					
45	Benzoin $C_6H_5CHOHCOC_6H_5$ ($C_{14}H_{12}O_2$)	000119539 (QYR&VR *DXLV)	—	LDLo:500 mg/kg orl-hmn	—	—
46	Benzonitrile Phenyl cyanide C_6H_5CN (C_7H_5N)	000100470 (NCR)	LDLo:720 rat	High toxicity LD50:1200 mg/kg, skn-rat LCLo:950 ppm/8H, ihl-rat LDLo:180 mg/kg, scu-mus LDLo:200 mg/kg, scu-rbt	—	—
47	Benzophenone $C_6H_5COC_6H_5$ ($C_{13}H_{10}O$)	000119619 (RVR)	2895 mus	Unknown LD50:727 mg/kg ipr-mus	—	—
48	p-Benzoquinone (also Quinone) OC_6H_4O ($C_6H_4O_2$)	000106514 (L6V DVJ)	130 rat 2)204 120 rat 3)952	LDLo:40 mg/kg orl-hmn Irr to skn & eyes LCLo:320 mg/m^3, ihl-mus LD50:8.5 mg/kg ipr-mus LD50:25 mg/kg, ivn-rat	USOS air: TWA 0.1 ppm or 0.4 mg/m^3	TDLo:2000 mg/kg/28WC, TFC:NEO, skn-mus
49 DP	Benzotrichloride (Toluene, α, α, α-trichloro-) $C_6H_5CCl_3$ ($C_7H_5Cl_3$)	000098077 (GXGGR)	600 rat	Irr to skn & muc mem LDLo:125 ppm/4H, ihl-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					tobacco; flavors; perfumes; dentifrices; medicine (germicides); corrosion inhibitors; paints & pigments; dyes	
Condensation (benzaldehyde, potassium cyanide)	354	Air: ethanol, HCN Water: benzoin, benzaldehyde, potassium cyanide	—	—	Organic synthesis; intermediate; photopolymerization catalyst; wetting & emulsifying agent; stilbesterol products	1)813 2)197 7)3-365
Ammonolysis (toluene, ammonia, MoO_3 catalyst)	324	Air: HCN, other cyanide bearing compounds Emission factors: benzene - 2.0 ammonia - 2.0	—	—	Synthesis of benzoguanamine; intermediate for rubber chemical; solvent for nitrile rubber, specialty lacquer, & many resins & polymers & many anhydrous metallic salts	1)758 2)198 3)407 12)
Friedel-Crafts Reaction and Hydrolysis, condensation (benzene, carbon tetrachloride, aluminum chloride	249	Air: HC1 Water: acid, carbon tetrachloride, aluminum salts Solids: tars, aluminum hydroxide	—	0.33/1973 0.43/1974	Organic synthesis; perfumery; odor fixative; derivatives are used as ultraviolet absorbers; flavoring; polymerization inhibitor for styrene; pesticides	1)601 2)199 3)407 7)3-441
Oxidation (aniline, MnO_2, H_2SO_4	15	Air: ammonia	—	—	Manufacture of dyes & hydroquinone	1)75 2)204 3)952 5)562
Chlorination (toluene, chlorine, PCl_3 or PCl_5)	333	Water: chloride salts (see Item 54 DP)	—	—	Synthetic dyes; organic synthesis; insecticide; degreasing solvent; dielectric fluid; lubricating oil additive; coolant	1)773 2)916 3)408 4)135 7)5-265

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
50 DP	Benzoyl chloride C_6H_5COCl (C_7H_5ClO)	000098884 (GVR)	—	TCLo:2 ppm/1M TFX:IRR, ihl-hmn Lachrymator, Powerful eye, skn, mucous membrane irr	—	—
51	Benzyl alcohol $C_6H_5CH_2OH$ (C_7H_8O)	000100516 (QIR)	3100 rat 4)138 1230 rat 2)1215 1580 mus 1040 rbt 100 bdw	LDLo:500 mg/kg orl-hmn Irr to skn & muc mem, vertigo nausea & diarrhea LC50:1000 ppm/8H, ihl-rat	—	—
52	Benzyl amine $C_6H_5CH_2NH_2$ (C_7H_9N)	000100469 (Z1R)	—	Highly irr to eye, skn, mucous membrane	—	—
53	Benzyl benzoate (Benzoic acid, benzyl ester) $C_6H_5COOCH_2C_6H_5$ $(C_{14}H_{12}O_2)$	000120514 (RVO1R)	1700 rat 1400 mus 2240 cat 1800 rbt 1000 gpg	LD50:500 mg/kg orl-hmn	—	—
54 DP	Benzyl chloride (Toluene, -Chloro) $C_6H_5CH_2Cl)$ (C_7H_7Cl)	000106434 (G1R)	1231 rat 1624 mus	Lacrymator TCLo:16 ppm, TFX:UNS, ihl-hmn LC50:150 ppm/2H ihl-rat LD50:1000 mg/kg, scu-rat	USOS air: TWA 1 ppm or 5 mg/m^3	TDLo:50 mg/kg scu-rat, TFX:NEO TDLo:2100 mg/kg/51WI, TFX:NEO, scu-rat
55	Benzyl dichloride [Benzene, (Dichloromethyl)] $C_6H_5CHCl_2$ $(C_7H_6Cl_2)$	000098873 (GYGR)	3249 rat	CNS depressant; strong irr & lachrymator	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Exchange, hydration (benzotrichloride, benzoic acid)	336	**Emission factors:** HCl - 5.0, SO_2 - 3.0, benzoic acid - 0.1	—	—	Medicine; intermediate for production of benzoyl groups; intermediate for other organics	1)779 2)215 3)408 12)
Substitution, hydrolysis (benzyl chloride, sodium carbonate)	334	**Water:** NaCl, sodium carbonate	—	5.9/1973 6.3/1974	Perfumes & flavors; photo developer for color movie films; dyeing nylon filament, textiles & sheet plastics; solvent for dyestuffs, cellulose esters, casein, waxes, etc.; heat-sealing polyethylene films; intermediate for benzyl esters & ethers; local anesthetic; cosmetics, ointments, emulsions; ballpoint pen inks & stencil inks	1)775 2)215 3)409 4)138 12)
Amination (benzyl chloride, ammonia)	335	**Water:** secondary and tertiary amine quaternary salts	—	—	Chemical intermediate for dyes, pharmaceuticals & polymers	1)777 3)410
Esterification (benzaldehyde, sodium hydroxide)	332	**Water:** sodium hydroxide, sodium benzoate benzaldehyde	—	0.64/1974	Fixative & solvent for musk in perfumes & flavors; medicine (external); plasticizer; miticide; insect repellent; cosmetics	1)771 2)185 3)410 4)138 7)3-432 12)
(See benzotrichloride above)	333	**Emission factors:** toluene - 2.0, HCl - 2.0, benzyl chloride - 1.0, HCl - 2.0	—	36.5/1972	Synthesis: 65% butyl phthalate, 14% benzyl alcohol, 12% quaternary ammonium compounds, dye intermediate; synthetic tannins; perfumery; pharmaceuticals; manufacture of photo developer; gasoline gum inhibitor; pencillin precursors	1)773 2)914 3)410 5)560 6)611 8)308 12)
(See benzyl chloride)	333		—	—	Dyes	1)773 2)159 3)402

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
56	Biphenyl (Diphenyl) $C_6H_5C_6H_5$ $(C_{12}H_{10})$	000092524 (RR)	3280 rat 2410 rbt	TDLo:4.4 mg/m^3 TFX:IRR, ihl-hmn Experimentally caused paralysis & convulsions in animals	USOS air: TWA 0.2 ppm or 1 mg/m^3	—
57	Bisphenol A (Phenol, 4, 4'-isopropylidenedi-) $HOC_6H_4C(CH_3)_2C_6H_4OH$ $(C_{15}H_{16}O_2)$	000080057 (QR DXR DQ)	4040 rat 6500 mam	LD50:150 mg/kg, ipr-mus	USOS air: TWA 0.5 ppm or 2.8 mg/m^3	—
58	Bromobenzene Phenylbromide (Benzene, bromo-) (C_6H_5Br)	000108861 (ER)	—	Irr to eyes and mucous membranes	—	—
59G	Bromonapthalene	02497514 (L66J BE)	—	—	—	—
59	(1-Bromonapthalene) $C_{10}H_7Br$ (Naphthalene, bromo-)	Ditto (L66J BE)	—	—	—	—
60	Butadiene CH_3CHCCH_2 (C_4H_6)	000106990 (1U2U1)	5480 rat	LCLo: 250,000 ppm/25M, ihl-hmn Irr to eyes & muc mem; ihl of high concen can cause unconsciousness & death	USOS air: TWA 1000 ppm	—
	Ditto	Ditto	—	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ullmann Reaction, Substitution (Bromobenzene, benzene, sodium or copper)	51	**Air:** benzene	—	2.3/1971	Organic synthesis: heat transfer agent; fungicides; dyeing assistant for polyester	1)152 2)229 3)622 5)560
Alkylation (Phenol, acetone, HCl)	256	**Water:** Flow - 458.8 dm^3/gm COD - 17.1 kg/Mg TDC - 5.2 kg/Mg Phenol - 7.1 kg/Mg **Emission factors:** acetone - 3.0, phenol - 3.0, HCl - 1.0	—	145/1973 171/1974 214/1978	Manufacture: 49% epoxy resins, 38% polycarbonate resins, phenoxy & polysulfone resins; brake fluids; fungicide for textiles & cable coverings	1)625 2)645 3)420 5)560 6)612 7)1-912 12) 13)29
Bromination (Benzene, bromine, catalyst)	50	**Air:** benzene	—	—	Solvent; motor fuels; top-cylinder compounds; crystallizing solvent; organic synthesis	1)151 2)158 3)432
Bromination (Naphthalene, bromine, carbon tetrachloride, catalyst)	214	**Air:** hydrogen bromide, carbon tetrachloride **Water:** hydrogen bromide, napthalene, bromonaphthalenes	—	—	Organic synthesis; microscopy; refractometry	1)527
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
Dehydrogenation (n-butenes, hydrogen, furfural, catalysts-Dow type B or Shell 205)	59	**Water:** Flow - 417 m/Gg TOC - 100 to 200 g/m^3 COD - 250 to 375 g/m^3 Solids - 3 to 4 kg/m^3 **Air:** furfural or acetonitrile	—	1674/1974 1202/1975 1600/1978	47% styrene-butadiene rubber, 17% polybutadiene; 8% syn adiponitrile, 6% ABS resins; 3% nitrile rubber; latex paints; misc.	1)191 2)236 3)437 6)612 7) 13)30
Oxidative dehydrodration (n-butenes, air, H_2, furfural or acetonitrile)	240	Ditto	—	Ditto	Ditto	1)584

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	—	See item above	See item above	—
61	Butane $CH_3CH_2CH_2CH_3$ (C_4H_{10})	000106978 (4H)	—	Asphyxiant LC50:658 gm/m^3, ihl-rat	Air: TWA 500 ppm	—
62G	Butenes (3 isomers) (Butylenes) $CH_3CH_2CHCH_2$ (C_4H_8)	—	—	Asphyxiant	—	—
62	1-Butene (-butylene)	000106989 (3U1)	—	Ditto	—	—
63	2-Butene (cis and trans)	000107017 (2U2)	—	Ditto	—	—
64	Isobutylene (Propene-2-methyl)	000107017 (1YU1)	—	Ditto	—	—
65G	Butyl acetates (4 isomers)	—	—	—	—	—
65	n-Butyl acetate (Acetic acid, n-Butyl ester) $CH_3COOC_4H_9$ ($C_6H_{12}O_2$)	000123864 (4OV1)	14,000 rat LDLo: 1500 gpg	LDLo:500 mg/kg orl-hmn TFX:IRR, ihl-hmn Irr to eyes & respiratory tract; evidence of chronic systemic toxicity is inconclusive LDLo:1500 mg/kg, ipr-rat	USOS air: TWA 150 ppm or 710 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production	Uses	References
Dehydrogenation (n-butane, H_2, furfural or acetonitrile)	241	See item above	—	See item above	See item above	1)586
Separation	—	—	—	—	Chem. mfr.; liquidied gas; heating; motor fuels; refrigerants; solvent; flooding agent; blowing agent;	1)236 2)239 3)480 7)3-815
Dehydrogenation (n-butane, furfural, or acetonitrile solvent)	238	Water: furfural or acetonitrile, various C_4 hydrocarbons Air: light hydrocarbons	—	10,074/1967	87% gasoline; manufacture: 6.0% butadiene, 1.9% butyl elastomers, 1.8% secbuyl alcohol, 1.5% polybutenes, 0.5% specialty chemicals (C_4 & C_5 alcohols, aldehydes & derivatives) 0.3% diisobutylene, 0.3% polyisobutylenes, 0.25% keptenes, 0.1% miscellaneous	
Ditto	Ditto	Ditto	—	494/1974	Synthesis: 75% butadiene, 23% sec-butyl alcohol, 2% miscellaneous	3)446 13)30
Ditto	Ditto	Ditto	—	Ditto	—	3)438
Dehydrogenation (isobutane)	75	Ditto	—	Ditto	Manufacture: 72% butyl elastomers, 18% specialty chemicals, 10% polyisobutylenes	1)200 3)750 13)40
—	—	—	—	—	—	—
Esterification (n-butanol, acetic acid, sulfuric acid)	99	Water: n-butyl acetate, n-butanol, acetic acid, sulfuric acid Air: n-butylacetate, n-butanol **Emission factors:** n-butyl acetate - 1.0, n-butanol - 1.0	—	36.8/1973	60% solvent in production of lacquer, lacquer enamels, pyroxylin solutions; leather dressings; perfumes, flavoring extracts; solvent for natural gums & synthetic resins; dehydration agent	1)268 2)16 3)440 5)560 6)613 12) 13)30

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
66	sec-Butyl acetate (Acetic acid, sec-Butyl ester) $CH_3COOC_4H_9$ ($C_6H_{12}O_2$)	000105464 (2Y0V1)	—	—	USOS air: TWA 200 ppm or 950 mg/m^3	—
—	Isobutyl acetate (see 249)					
67	tert-Butyl acetate (Acetic acid, tert-Butyl ester) $CH_3CO_2O(CH_3)_3$ ($C_7H_{12}O_2$)	000540885 (1X0V1)	—	—	USOS air: TWA 200 ppm or 950 mg/m^3	—
68G	Butyl acrylates (4 isomers)	—	—	—	—	—
68	n-Butyl acrylate (2-Propenoic acid, butyl ester) ($C_9H_{12}O_2$)	000141322 (4OV1U1)	3730 rat	LCLo:1000 ppm/4H, ihl-rat LD50:2000 mg/kg, skn-rbt LD50:926 mg/kg ipr-mus	—	—
69	iso-Butyl acrylate	000106638 (1Y10V1U1)	7460 rat	LCLo:2000 ppm, ihl-rat LD50:890 mg/kg, skn-rbt	—	—
70G	Butyl alcohols (4 isomers)	—	—	—	—	—
70 DP	n-Butyl alcohol $CH_3(CH_2)_2CH_2OH$ ($C_4H_{10}O$)	000071363 (Q4)	790 rat (Ref 2) 4360 rat (Ref 4) LDLo:4250 rbt	LDLo:500 mg/kg orl-hmn TCLo:25 ppm, TFX:PUL, ihl-hmn Mild irr to eyes, nose & throat; mild dermatitis LDLo:970 mg/kg, ipr-rat	USOS air: TWA 100 ppm or 300 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Esterification (sec-butyl alcohol, acetic acid, sulfuric acid)	57	Water: 1% ester, 3% alcohol Air: ester & alcohol vapors	—	24.9/1967	Solvent for nitrocellulose; lacquer; thinners; nail enamels; celluloid products; artificial leather; leather finishes; plastic wood; washable wallpaper	1)166 2)16 3)440 5)560
Esterification (tert-butyl alcohol or isobutylene, glacial acetic acid)	72	Water: acid, alcohol, acetate	—	—	Possible antiknock agent in gasoline	1)195 2)16 3)483 5)560
—	—	—	—	—	—	—
Esterification (Acrylic acid, n-butanol, benzene)	277	Water: acrylic acid, sulfuric acid, n-butanol, n butylacrylate, benzene Emission factors: acrylic acid - 2.0, butyl acetate - 2.0	—	58.1/1973	Intermediate in organic synthesis; polymers & copolymers for emulsion & solvent coatings, adhesives, paints, binders, emulsifiers	1)666 2)765 3)441 9)204 12) 13)30
Esterification (acrylic acid, isobutanol, benzene)	Ditto	Water: acrylic acid, sulfuric acid, isobutanol, isobutyl acrylate, benzene	—	—	Ditto	1)666 2)50
—	—	—	—	—	—	—
Reduction (Crotonaldehyde, hydrogen)	97	Water: n-butanol, crotonaldehyde Emission factors: CO - 152.0, hydrocarbons - 5.0	Heavy ends incinerated	235/1973 254/1974 155/1975 294/1978	20% solvent for surface coatings; manufacture: 14% glycol ethers, 12% plasticizers, 12% n-butyl acetate, 10% amino resins, 7% n-butyl acrylate, 10% exports, 15% miscellaneous (e.g., butyl amines and 2,4-D esters).	1)264 2)244 3)441 4)178 5)560 6)614 7)3-828 12) 13)30

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	See item above	See item above	See item above	See item above
71	sec-Butyl alcohol $CH_3CH_2CHOHCH_3$ $(C_4H_{10}O)$	000078922 (QY2)	6,480 rat LDLo: 6000 rat	LD50:771 mg/kg, ipr-mus LCLo:16000 ppm/ 4H ihl-rat	USOS air: TWA 150 ppm or 450 mg/m^3	—
72	tert-Butyl alcohol $(CH_3)_3COH$ $(C_4H_{10}O)$	000075650 (QX)	3500 rat LDLo: 4500 rbt	LD50:933 mg/kg, ipr-mus	USOS air: TWA 100 ppm or 300 mg/m^3	—
73 DP	n-Butylamine $C_4H_9NH_2$ $(C_4H_{11}N)$	000109739 (Z4)	[illegible] rat	LCLo:4000 ppm/ 4H, ihl-rat LD50:500 mg/kg, skn-gpg LD50:850 mg/kg skn-rbt	USOS air: CL 5 ppm (skn) or 15 mg/m^3 (skn)	—
74	sec-Butylamine $CH_3CH_2CH(NH_2)CH_3$ $(C_4H_{11}N)$	000513495 (ZY2)	380 rat 225 dog	LD50:2500 mg/kg skn-rbt	—	—
75	tert-Butylamine $(CH_3)_3CNH_2$ $(C_4H_{11}N)$	000075649 (ZX)	180 rat 900 mus	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production	Uses	References
Oxoprocess, Reduction (n-butyraldehyde, hydrogen)	282	**Air:** organic vapors, hydrogen	Heavy ends burned; process involves no waste water & minimal air pollution	—	See item above	1)674 7)3-828
Hydration, Sulfation & Hydrolysis (n-butenes, sulfuric acid)	55	**Water:** butyl alcohol, sodium hydroxide, sodium sulfate, sulfuric acid	—	205.6/1973	95% synthetic methyl ethyl ketone; solvent; organic synthesis; enamels & lacquers; hydraulic break fluid; industrial cleaning & paint removal; ore flotation; fruit essences, perfumes, dyestuffs & wetting agent	1)162 2)245 3)441 4)178 5)560 7)3-829 12) 13)30
Hydration, Sulfation & Hydrolysis (isobutylene, sulfuric acid)	67	**Water:** t-butyl alcohol, sodium hydroxide, sodium sulfate, sulfuric acid	—	508.5/1973	Alcohol denaturant, chemical manufacture; perfumes; denaturant	1)186 2)248 3)441 5)560 7)3-829
Reductive Amination, Amination (n-butyraldehyde, ammonia, hydrogen, alcohol as solvent)	284	**Water:** reactants, product, spent catalysts **Emission factors:** butyraldehyde - 3.0, NH_3 - 1.0	—	1.82/1973	Intermediate for emulsifying agent; pharmaceuticals, insecticides, rubber chemicals; dyes; tanning agent; soaps; flotation agent; corrosion inhibitor; antioxidants for gasoline; color photo; curing agent for siloxanes	1)677 2)245 3)441 5)560 7)2-124 12)
Amination (2-butanol, ammonia)	58	**Air:** CO_2, formaldehyde, alcohols, ammonia **Emission factors:** butyraldehyde - 3.0, NH_3 - 1.0	—	—	—	1)168 2)245 3)441 12)
Amination (Isobutylene, sulfuric acid, hydrogen cyanide, or tert-butyl alcohol, ammonia, hydrogen and Ni catalyst)	71	**Air:** ammonia, hydrogen	—	—	Intermediate for rubber accelerators; insecticide; fungicides; dyestuffs; pharmaceuticals	1)193 2)245 3)442

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
76	tert-Butylbenzoic acid (Benzoic acid, t-Butyl-) $HOOCC_6H_4C(CH_3)_3$ $(C_{11}H_{14}O_2)$	001320167 (QVR BX)	735 rat	Mild local irr	—	—
77	1,3-Butylene glycol (1,3-Butanediol) $CH_3CH(OH)CH_2CH_2OH$ $(C_4H_{10}O_2)$	000107880 (QY2Q)	23,000 rat 11,000 gpg	Low toxicity	—	—
78 DP	tert-Butyl phenol (Phenol, tert-Butyl) $(CH_3CHC_2H_5)C_6H_4OH$ $(C_{10}H_{14}O)$	000098544 (QR DX)	5660 rat	LD50:2520 mg/kg, skn-rbt	—	—
79	p-tert-Butyltoluene (Toluene, p-tert-Butyl-) $C_4H_9C_6H_4CH_3$ (C_3H_{16})	000098511 (IXRD)	1500 rat 900 mus 2000 rbt	TCLo:10 ppm/3M, TFX:IRR, ihl-hmn TCLo:20 ppm/3M TFX:CNS, ihl-hmn Irr to lungs; CNS depressant; liver & kidney damage after prolonged exposure LC50:1500 mg/m^3 4H, ihl-rat LC50:248 ppm/2H, ihl-mus	USOS air: TWA 10 ppm	—
80	n-Butyraldehyde $CH_3(CH_2)_2CHO$ (C_4H_8O)	000123728 (VH3)	2490 rat	TCLo:580 mg/m^3, TFX:IRR, ihl-hmn LD50:2400 mg/kg, scu-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Oxidation (tert-butyltoluene, air, catalyst)	70	**Water:** tert-butyl toulene, tert-butylbenzoic acid	—	—	Resins & plastics; alkyd resin modifier; corrosion inhibitors	1)192 2)187 3)443 7)436
Reduction (Acetaldol, hydrogen)	86	**Air:** ethanol, n-butanol, 2,4-dimethyl-1,3-dioxane **Water:** dibutylene glycols, acetaldehyde, acetaldol, 1,3-butylene-glycol	—	—	Polyesters; polyurethanes; surface active agents; plasticizers; humecant; coupling agents; solvent; food additive & flavoring	1)241 2)238 3)446 4)181
Alkylation (Isobutylene or tert butyl alcohol, phenol, catalysts)	73	**Water:** isomeric butyl phenols, isobutylene polymers	—	—	Chemical intermediate for synthetic resins, plasticizers, surface-active agent, perfumes & other products; a permissible antioxidant for aviation gasoline; plasticizer for cellulose acetate; intermediate for antioxidants,special starches, oil-soluble phenolic resins; pour-point depressors & emulsion breakers for petroleum oils & some plastics; synthetic lubricants; insecticides; industrial odorants	1)196 2)641 3)451
Alkylation (Isobutylene or tert-butyl alcohol, toluene, sulfuric acid)	69	**Water:** sodium hydroxide, tert-butyl toluene	—	—	Solvent; intermediate	1)190 2)913 3)452
Hydrogenation (Crotonaldehyde, hydrogen)	88	**Air:** crotonaldehyde, butyraldehyde	—	216/1973	Polyvinyl butyral; butyrate plastics; coating fabrics; rubber accelerators	1)245 2)247 3)453 7)3-873 9)203 12)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	See item above	—	—	—
81	n-Butyric acid $CH_3(CH_2)_2COOH$ $(C_4H_8O_2)$	000107926 (QV3)	2940 rat (Ref 2) 8790 rat (Ref 4) LDLo:500 mus	LD50:3180 mg/kg, ipr-mus LD50:3180 mg/kg, scu-mus LD50:800 mg/kg, ivn-mus LD50:530 mg/kg skn-rbt	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
82	n-Butyric anhydride $[CH_3(CH_2)_2CO]_2O$ $(C_8H_{14}O_3)$	000106310 (3VOV3)	—	Moderate irr	—	—
83	n-Butyronitrile $CH_3CH_2CH_2CN$ (C_4H_7N)	000109740 (NC3)	500 rat LDLo:100 rbt LDLo:100 mus	Animal experiments show high toxicity similar to cyanides; poison LCLo:400 ppm, ihl-rat LD50:500 mg/kg, skn-rbt	—	—
84	Carbon disulfide (CS_2)	000075150 (SCS)	—	LDLo:14 mg/kg, orl-hmn LCLo:4000 ppm/30M, ihl-hmn TCLo:50 mg/m^3/7Y; TFX:CNS, ihl-hmn CNS effect, narcotic & anesthetic, respiratory failure; death; permanent damage may occur in cases of chronic poisoning	USOS air: TWA 20 ppm; Cl 30 ppm; Pk 100 ppm/30M/8H	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Oxo process (Propylene, syn gas, toluene solvent, cobalt carbonyl catalyst)	278	**Air:** CO, propylene, propane **Emission factors:** CO - 4.0, propylene - 1.0, propane - 1.0	Light ends may be flared	—	See item above	1)667
(See Acetic Acid) (n-Butane, O_2, catalyst-usually cobalt acetate)	227	—	—	—	Molded & extruded products; lenses; cable lacquer; fishing equipment; flavors; pharmaceuticals	1)560 2)248 3)453 7)3-881
Oxidation (n-butyraldehyde, air or oxygen, manganese butyrate or cobalt salt catalyst)	89 233	**Air:** n-butyraldehyde, butyric acid **Emission factors:** hydrocarbons - 2.0	—	—	Synthesis of butyrate ester perfume & flavor ingredients; pharmaceuticals; deliming agent; disinfectants; emulsifying agent; sweetening gasolines	1)247 2)248 3)453 4)184 6)719 7)3-881 12)
Exchange (Butyric acid, acetic acid or acetic anhydride)	283	**Water:** acetic acid, acetic anhydride, butyric acid, butyric anhydride	—	—	Manufacture of butyrates; drugs, tanning agents	1)676 3)453
Substitution, Displacement (n-propyl chloride, sodium cyanide, n-propyl alcohol)	232	**Water:** NaCl, propyl alcohol, propyl chloride, butyronitrile, sodium cyanide **Air:** propyl chloride, propanol, hydrogen cyanide	—	—	Basic material in industry, chemical & pharmaceuticals intermediate products; poultry medicines	1)568 2)252 3)453
Substitution, Sulfiding (Methane, sulfur)	164	**Air:** sulfur, H_2S, SO_2, gaseous hydrocarbons, CS_2	—	352/1973 355/1974 218/1975 216/1978	Manufacturing: 39% viscose rayon, 14% cellophane, 25% carbon tetrachloride: flotation agent, veterinary medicine; solvent, rubber accelerator	1)419 2)283 3)469 4)208 6)615 7)4-384 11)37 13)31

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
84 (Continued)				LDLo:300 mg/kg, scu-rbt LDLo:400 mg/kg, ipr-rat		
85	Carbon tetrabromide (CBr_4)	000558134 (EXEEE)	LDLo:100 rat	Narcotic in high concen LD50:298 mg/kg, scu-mus	Air: TWA 100 ppb	—
86	Carbon tetrachloride (CCl_4)	000056235 (GXGGG)	2800 rat 6380 rbt	LCLo:1000 ppm, ihl-hmn TCLo:20 ppm, TFX:CNS, ihl-hmn LCLo:43 mg/kg, orl-hmn TDLo:1800 mg/kg TFX:SYS&PUL orl-wmn TDLo:1700 mg/kg TFX:CNS, orl-man Narcotic; death results due to respiratory failure; in cases that recover, serious kidney, liver & lung damage occurs; lower doses produce severe gastro-intestinal upset, kidney & hepatic damage TCLo:300 ppm/ (6-15 D preg) TFX:TER, ihl-rat LC50:9526 ppm/8H, ihl-mus LCLo:4000 ppm/4H ihl-rat LDLo:1000 mg/kg, orl-dog LDLo:125 mg/kg, ivn-dog	USOS air: TWA 10 ppm; 65 mg/m^3 CL: 25 ppm PK: 200 ppm/ 5M/4H Dec. 1975: NIOSH recommended std USOS air: TWA 2 ppm/10HD/ 40 HW or 12.6 mg/m^3	TDLo:4800 mg/ kg/88DI, TFX: CAR, orl-mus TDLo:133 gm/kg/ 25WI, TFX:NEO scu-rat TDLo:3680 mg/kg/ 30WI, TFX:CAR, orl-ham TDLo:159 gm/kg/ 25WI, TFX:CAR, scu-rat TDLO:159 gm/kg/ 20WI, TFX:CAR, rec-mus TDLo:120 mg/kg/ 88DI, TFX:CAR, orl-mus
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Bromination (Methane, bromine Carbon tetrachloride, aluminum tribromide)	162	Air: bromomethanes, hydrogen bromide	—	—	Organic synthesis	1)416 2)285 3)471
Oxychlorination (Ethylene dichloride, chlorine)	140	Air: chlorohydrocarbons, chlorine	Heavy ends usually incinerated	476/1973 529/1974 413/1975 335/1978	Manufacturing: 52% Freon 12, 28% Freon 11; metal degreasing; agricultural fumigant; chlorinating organic compounds; production of semiconductors; cleaning agent; fire extinguishers; insecticide; flour bleaching; pharmaceuticals; petroleum refining; lubricant	1)364 2)285 3)471 6)618 8)89 13)31
Chlorination & Pyrolysis (LPG or natural gas, ethane, propane, chlorine, sodium hydroxide, inhibitors)	234	Ditto	—	Ditto	Ditto	1)571 7)5-137

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item	See item	See item above	See item above	—
87	Cellulose acetate	009004357	—	Unknown	—	—
88 DP	Chloranil (P-Benzoquinone, 2,3,5,6-tetrachloro-) $C_6O_2Cl_4$ ($C_6Cl_4O_2$)	000118752 (L6V DVJ-/G4)	4000 rat	LDLo:500 mg/kg, orl-hmn CNS depression, irr to skn & muc mem LDLo:500 mg/kg, ipr-rat LDLo:4 mg/kg, ipr-mus	—	TDLo:71 gm/kg/78W TFX:CAR, orl-mus
89 DP	Chloroacetic acid (Acetic acid, chloro-) $CH_2ClCOOH$ ($C_2H_3ClO_2$)	000079118 (QVIG)	76 rat 165 mus	LDLo:50 mg/kg, orl-hmn Extremely irr to eyes, skn, mucoup membranes LD50:5 mg/kg, scu-rat LDLo:500 mg/kg, ipr mus	—	LDLo:100 mg/kg TFX:NEO, scu-mus
90G	Chloroanilines (3 isomers) (Aniline, Chioro-) (C_6H_6ClN)	—	300 rat 100 mus 100 bdw	Allergens,damage blood (see Aniline) TCLo:44 mg/m^3 TFX:BLD, ihl-hmn	—	—
90	o-Chloroaniline (Aniline, o-Chloro-) (C_6H_6ClN)	000095512 (ZR BG)	256 mus	LDLo:222 mg/kg skn-cat LDLo:310 mg/kg, scu-cat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Chlorination (Methane, chlorine)	160	**Air:** various chloromethanes (8 kg/100 kg)	—	See item above	See item above	1)411
Acetylation (Cellulose, acetic acid, acetic anhydride, sulfuric acid, sodium acetate, sodium bicarbonate)	102	**Water:** Flow: 12-15 m^3/Mg ($200 g/m^3$ solids) degraded cellulose, sulfuric acid **Air:** various solvents **Emission factors:** Hydrocarbons - 10.0	—	378.9/1973	Manufacturing: 48% acetate fiber; 20% photo film, transparent sheeting, thermoplastic molding composition; 24% cigarette filters; lacquers; protective coating solutions	1)275 6)615 12) 13)31
Oxidation, Chloroxidation (2,4,6-trichlorophenol, chlorine, fuming sulfuric acid)	299	**Water:** 2,4,6-trichlorophenol, other chlorophenols, chlorine, sulfuric acid, chloranil	—	—	Agricultural fungicide; dye intermediate; electrodes for pH measurements; vulcanizing agent	1)708 2)204 3)1013
Chlorination (Acetic acid, chlorine)	104	**Water:** hydrogen chloride, chlorine, sodium hydroxide, chlorinated byproducts **Air:** acetic acid, chloroacetic acid, chlorine, hydrogen chloride **Emission factors:** hydrocarbons - 2.0; HC1 - 4.0	Absorbers, scrubbers	29.1/1969	Manufacturing: 50% herbicide, 40% production of carboxymethylcellulose; ethyl chloroacetate, glycine, synthetic caffeine, sarcosine, thioglycolic acid, EDTA, 2,4-D, 2,4,5-T; synthetic dyes; medical & pharmaceuticals	1)283 2)17 3)838 7)8-417 12)
Chlorination & Hydrolysis (Acetanilide, acetic acid, chlorine)	18	**Air:** chlorine	—	—	Dye intermediate	1)81 7)2-419
Reduction or Chlorination (m-nitrochlorobenzene, hydrogen or aniline, conc sulfuric acid, chlorine)	—	—	—	—	Dye intermediate; standards for colormetric apparatus; manufacture of petroleum solvents & fungicides	2)94 3)488

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
91	p-Chloroaniline (Aniline, p-Chloro-) (C_6H_6C1N)	000106478 (ZR DG)	300 rat 420 rat 100 mus 100 bdw	TCLo:44 mg/m^3, TFX:BLD, ihl-hmn LD50:420 mg/kg, ipr-rat LDLo:125 mg/kg, scu-cat LDLo:36 mg/kg, skn-rbt	—	—
92	m-Chloroaniline (Aniline, m-Chloro-) (C_6H_6C1N)	000108429 (ZR CG)	880 rat	LD50:223 mg/kg, skn-cat LDLo:125 mg/kg, scu-cat	—	—
93G	Chlorobenzaldehyde (3 isomers) (Benzaldehyde, p-chloro) ClC_6H_4CHO (C_7H_5ClO)	000098884 (VHR XG)	—	—	—	—
93	o-Chlorobenzabaldehyde	000089985 (VHR BG)	—	LDLo:10 mg/kg ipr-mus	—	—
94 DP	Chlorobenzene (Benzene, chloro-) (C_6H_5Cl)	000108907 (GR)	2910 rat 2830 rbt	Strong narcotic with only slight irr qualities. Prolonged exposure may cause kidney & liver damage LDLo:7000 mg/kg, scu-rat	USOS air: TWA 75 ppm or 350 mg/m^3	—
95G	o- and p-chlorobenzoic acids	—	—	—	—	—
95 DP	p-Chlorobenzoic acid (p)(Benzoic acid, chloro-) $ClC_6H_4CO_2H$ ($C_7H_5ClO_2$)	026264095 (QVR XG)	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
See above item	—	—	—	—	Dye intermediate, pharmaceuticals, agricultural chemicals	2)94 3)488
Ditto	—	—	—	—	Intermediate for azo dyes & pigements; pharmaceuticals, insecticides; agricultural chemicals	2)94 3)488
Chlorination & Hydrolysis (Chlorotoluene, chlorine)	346	Water: chlorobenzalchlorides, chlorotoluenes, aldehydes Air: chlorine	—	—	Intermediate in the preparation of triphenyl methane & related dyes; organic intermediate	1)797
—	—	—	—	—	—	2)144
Chlorination (Benzene, chlorine, sodium hydroxide catalyst)	4	Air: benzene, HCl Water: HCl, dichlorobenzene **Emission factors:** benzene - 7.4, ethyl chloride - 1.3, ethylene dichloride - 0.1	Absorber, stripper	180.5/1973	Synthesis: 50% nitrochlorobenzenes, 20% solvent, 10% phenol, DDT; solvent carrier for methylene diisocyanate; intermediate & solvent dye intermediate; insect repellants; dielectrics; lubricating oil additive; coolant in the electrical industry	1)55 2)158 3)488 5)560 6)617 7)5-265 9)22 12) 13)31
Chlorination & Hydrolysis, Oxidation (o-chlorotoluene or p-chlorotoluene, chlorine, zinc chloride catalyst)	347	Air: HCl & Cl_2 Water: chlorobenzoic acids, chlorobenzaldehyde, chlorobenzyl alcohol, sodium salts, catalyst	Gas absorber	—	Intermediates for the preparation of dyes, fungicides, pharmaceuticals & other organic chemicals; glues; paints; fungicide; plant growth regulator	1)799 7)3-437
Ditto	Ditto	Ditto	Ditto	—	Ditto	Ditto

TABLE A-1. (CONTINUED)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
96G	o- and p-Chlorobenzoyl chlorides (Benzoyl chloride, chloro-) ClC_6H_4COCl ($C_7H_4Cl_2O$)	— (GVR XG)	—	—	—	—
96	Chlorobenzoyl chloride,o-	000609654 (GVR BG)	—	—	—	—
97	Chlorobenzoyl chloride,p-	000112010 (GVR DG)	—	—	—	—
98 DP	Chlorobenzoyl chloride,m-	000618462 (GVR CG)	—	—	—	—
99	Chlorodifluoroethane (Ethane, chlorodifluoro-) Freon 142 $ClF_2C_2H_3$ ($C_2H_3ClF_2$)	000075683	—	LCLo:50 pph/30 M ihl-rat	—	—
100	Chlorodifluoromethane (Methane, chlorodifluro-) Freon 22 $ClHCF_2$	000067663 (GYFF)	—	Asphyxiant in high concen LCLo:25%/44 ihl-rat	—	—
101	Chloroform ($CHCl_3$)	000067663 (GYGG)	800 rat LDLo:2400 mus LDLo:1000 dog	LDLo:40 mg/kg , orl-hmn TCLo:1000 mg/m^3/1Y TFX:SYS, ihl-hmn Anesthetic; paralysis & death. Narcotic, damage to liver & heart. TCLo:100 ppm/7H/(6-15 D preg) TFX:TER, ihl-rat LCLo:8000 ppm/4H, ihl-rat LC50:28 gm/m^3 ihl-mus LD50:704 mg/kg, scu-mus	USOS air: TWA 50 ppm or 240 mg/m^3 NIOSH recom USOS air: TWA 10 ppm-10 hr	TCLo:18 gm/kg/120DI, TFX:CAR, orl-mus TDLo:70 gm/kg/78 WI TFX:NEO, orl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Condensation (Chlorobenzoic acid, chlorobenzotrichloride)	348	**Air:** HCl, Cl_2 **Water:** chlorobenzotrichloride, chlorotoluene, chlorobenzoic acid, HCl	—	—	Intermediate for pharmaceuticals, dyes & other organic chemicals	1)801
Ditto	Ditto	Ditto	- -	—	Ditto	Ditto
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
Chlorination (Difluoroethane)	176	**Air:** chlorine, chlorinated compounds, acetylene, some vinyl chloride **Water:** NaCl, NaOH	Acid scrubber	—	Manufacturing: 52% aerosol propellant, 29% refrigerant, 9% foam blowing agent, miscellaneous	1)445 2)387 3)545 13)31
Substitution, Fluorination (Chloroform, hydrogen fluoride)	161	**Air:** chlorofluoromethanes **Water:** HCl, NaOH, NaCl	—	—	Manufacturing: 52% aerosols; 29% refrigerant, 9% foam blowing agent; chemical intermediate	1)415 2)709 3)491 7)5-126 13)32
Chlorination (Methane, chlorine)	159	**Air:** chloromethanes **Water:** NaOH, salts, acids **Emission factors:** methyl chloride - 26 26.0, methylene chloride - 4.0, carbon tetrachloride - 2.0, chloroform - 2.0, methane - 2.0	—	115/1973 134/1974	Manufacturing: 52% fluorocarbon refrigerants & propellants ($CHClF_2$): 41% fluorocarbon plastics; dyes & drugs; general solvent; fumigant; anesthetic	1)409 2)290 3)493 5)560 6)618 7)7-126 12) 13)32

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
101 (Continued)				LC50:100 gm/m^3 ihl-dog LCLo:75 mg/kg, ivn-dog LC50:59 gm/m^3 ihl-rbt		
102G	Chloronaphthalenes	—	—	—	—	—
102	Naphthalene, 1-chloro	000090131 (L66J BG)	1540 rat 1091 mus	TFX:SYS, ihl damage to liver	—	—
103	Naphthalene, 2-chloro ($C_{10}H_7Cl$)	000091587 (L66J CG)	2078 rat 886 mus	—	—	—
104G DP	Chloronitrobenzenes (Benzene, chloronitro-) $ClC_6H_4NO_2$)	025167935 (WNR XG)	—	Cumulative effects. Methemoglobin, cyanosis & blood changes	—	—
—	o-chloronitrobenzene	(WNR BG)	288 rat 35 mus	—	—	—
—	m-chloronitrobenzene	(WMR CG)	390 mus	TCLo:0.012 mg/m^3 ihl-hmn, eyes	—	—
104	p-chloronitrobenzene	000100005 (WNR DG)	420 rat 650 mus 1414 mus	LD50:420 mg/kg, ipr-rat	USOS air: TWA 1 mg/m^3 (skn)	—
105G	Chlorophenols	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Chlorination (Naphthalene, chlorine, sodium hydroxide)	213	Water: NaCl, NaOH, naphthalene, chlorinated napthalenes Air: chlorine	—	—	Wax; electrical condenser impregnation; moisture-, flame-, acid-, insect-proofing of wood, fabric & other fibrious bodies; moisture-, & flame-proofing covered wire & cable; solvent (for rubber, aniline & other dyes; mineral & vegetable oils, varnish gums & resins, & other waxes when mixed in the molten state	1)525
Ditto	Ditto	Ditto	—	—	Ditto	2)571
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
Nitration (Chlorobenzene, nitric acid, sulfuric acid)	7	Air: aromatics Emission factors: chlorobenzene - 3.2, NO_2 - 0.9, nitrochlorobenzene - 0.1	—	—	Intermediate, especially for dyes; manufacture of p-nitrophenol, from which parathion is made	1)61 12)
Ditto	Ditto	Ditto	—	—	Ditto	2)159 3)986
Ditto	Ditto	Ditto	—	—	Ditto	2)159 3)496
Ditto	Ditto	Ditto	—	63.6/1974	Ditto	2)159 3)858
—	—	—	—	—	—	1)705

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
105	(Phenol, m-chloro-)	000108430 (QR CG)	570 rat	LD50:355 mg/kg, ipr-rat LD50:1390 mg/kg, scu-rat	—	TDLo:6 gm/kg/ 15WI; TFX:NEO
106 DP	(Phenol, o-chloro-)	000095578 (QR BG)	670 rat 670 mus	LD50:230 mg/kg, ipr-rat LD50:950 mg/kg, scu-rat LDLo:950 mg/kg, scu-rbt LDLo:800 mg/kg, scu-gpg	—	TDLo:48 gm/kg/ 12WI, TFX:NEO, skn-mus
107 DP	(Phenol, p-chloro-) C_6H_4ClOH (C_6H_5ClO)	000106489 (QR DG)	670 rat 4)245	LD50:281 mg/kg, ipr-rat LD50:1030 mg/kg, scu-rat	—	—
108	m-Chlorotoluene (Toluena, m-chloro-) (C_7H_7Cl)	000108418 (GR C)	—	Narcotic in high concen. Details unknown	—	—
109 DP	o-Chlorotoluene (Toluene, o-chloro-) (C_7H_7Cl)	000095498 (GR B)	—	Unknown	—	—
110 DP	p-Chlorotoluene (Toluene, p-chloro-) (C_7H_7Cl)	000106434	—	Ditto	—	—
111G	Cresylic acid (Cresol) $C_6H_4OHCE_3$ (C_7H_8O)	001319773 (QR X)	1454 rat 861 mus	LCLo:50 mg/kg, orl-hmn Corrosive to skn & mucous mem Absorption may result in kidney, liver & CNS damage	USOS air: TWA 5 ppm (skn) or 22 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
—	—	—	—	—	Intermediate in organic synthesis, e.g., drugs; fire retardant phenolic resins	2)642 3)497 12)
Chlorination (Phenol, chlorine, sodium carbonate, hydrochloric acid)	298	**Water:** NaCl, HCl, phenol, chlorine, chlorophenols **Air:** Cl_2, HCl, solvent **Emission factors:** Cl_2 - 2.0, carbon tetrachloride - 1.0, phenol - 1.0	—	—	Dye intermediate; synthesis higher chlorophenols	1)705 2)642 3)497
Chlorination (Phenol, chlorine sodium carbonate, hydrochloric acid)	298	Ditto	—	—	Intermediate synthetic dyes & drugs; alcohol denaturant; selective solvent mineral oil refining	2)642 3)497 4)245
Sandmeyer Reaction, Replacement (m-toluidine, sodium nitrate, hydrochloric acid, duprous chloride)	344	**Air:** HCl, NO_x **Water:** HCl, m-toluidine hydrochloride, copper salts m-chlorotoluene	—	—	Solvent; intermediate	1)793 3)501
Chlorination (Toluene, chlorine, iron catalyst)	345	**Air:** Cl_2, HCl, Toluene **Water:** NaOH, NaCl, dichlorotoluenes	—	—	Solvent & intermediate for organic chemicals & dyes	1)795 3)501
Chlorination (Toluene, Chlorine, iron catalyst)	345	Ditto	—	—	Ditto	1)796 2)914 3)501
Springing & Separation	78	**Emission factors:** NO_2 - 4.2, hydrocarbons - 2.0 **Water:** caustic, phenols and cresols	—	78.6/1973 65.0/1978	22% phosphate esters; 15% phenolic resins; 15% laminates coatings for magnet wire for small electric motors; 15% antioxidants; 6% disinfectants; 6% ore flotation agent; organic intermediate; wire enamel solvent; plasticizers; gasoline additives metal	1)209 2)311 3)520 5)560 6)620A 12) 13)32

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
111G (Continued)						
111G	Cresols, m&p	— (QR X)	—	—	—	—
111 DP	m-Cresol (C_7H_8O)	000108394 (QR C)	242 rat 2)311 2020 rat 4)293 828 mus LDLo:1400 rbt	LD50:620 mg/kg, skn-rat LDLo:450 mg/kg, scu-mus LDLo:180 mg/kg, scu-cat LD50:2050 mg/kg, skn-rbt LDLo:500 mg/kg, scu-rbt LDLo:280 mg/kg, ivn-rbt LDLo:150 mg/kg, ivn-dog	USOS air: TWA 5 ppm (skn) or 22 mg/m^3	—
112 DP	o-Cresol (C_7H_8O)	00095487 (QR B)	121 rat 2)311 1350 rat 4)293 344 mus LDLo:940 rbt	Corrosive to skn & mucous mem. Absorption may result in kidney, liver & CNS damage LD50:1100 mg/kg, skn-rat LDLo:410 mg/kg, scu-mus LDLo:55 mg/kg, scu-cat LD50:1380 mg/kg, skn-rbt LDLo:450 mg/kg, scu-rbt LDLo:180 mg/kg, ivn-rbt LDLo:80 mg/kg, ivn-dog	—	—
113 DP	p-Cresol (C_7H_8O)	000106445 (QR D)	207 rat 2)311 1800 rat 4)293 344 mus LDLo:620 rbt	Corrosive to skn & mucous mem Absorption may result in kidney, liver & CNS damage	USOS air: TWA 5 ppm (skn) or 22 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
					cleaning compounds, surfactants, oil additives, solvent refining of lubricating oils, scouring compounds, pesticides	
See item above	See item above	See item above	—	41.8/1973	Similar to cresylic acid	1)209 12)
Vapor phase methylation (Phenol, methanol, Al catalyst)	82	**Air & Water:** cresols, phenol, methanol	—	Total m, o, p-cresol 52.4/1973	Similar to cresylic acid; disinfectant; phenolic resins: tricresyl phosphate; ore flotation; textile scouring agent; organic intermediate; manufacture of salicyladehyde, coumarin, & herbicides, food antioxidants; surfactant; molding compounds; adhesives	1)217 2)311 3)520 4)293 5)560 6)620A 7)6-442 12)
See Cresylic Acid	78	See Cresylic Acid	—	11.2/1973	Similar to cresylic acid; organic synthesis salicaldehyde, coumarin, miscellaneous	1)209 2)311 3)520 4)293 5)560
See m-cresol	82	See m-cresol	—	—	—	1)217
See m-cresol	82	See m-cresol	—	11.2/1973	Similar to cresylic acid	1)209 2)311 3)521 4)293 5)560

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
113 (Continued) DP				LD50:750 mg/kg, skn-rat LDLo:150 mg/kg, scu-mus LDLo:80 mg/kg, scu-cat LD50:301 mg/kg, skn-rbt LDLo:300 mg/kg, scu-rbt LDLo:180 mg/kg, ivn-rbt		
114	Crotonaldehyde $CH_3CHCHCHO$ (C_4H_6O)	000123739 (VH1U2-T)	300 rat 240 mus	TCLo:12 mg/m^3/10M TFX:IRR, ihl-hmn Lachrymator; strong irr; may cause corneal burns LC50:4000 mg/m^3/30M, ihl-rat LD50:140 mg/kg, scu-rat LC50:1510 mg/m^3/2H, ihl-mus LD50:140 mg/kg, scu-rat LD50:30 mg/kg, skn, gpg	—	—
115	Crotonic acid $CH_3CHCHCOOH$ $(C_4H_6O_2)$	003724650 (QV1U2-T)	1000 rat 4800 mus	Unknown LD50:600 mg/kg, skn-gpg LD50:100 mg/kg ipr-rat	—	—
116	Cumene $C_6H_5CH(CH_3)_2$ (C_9H_{12})	000098828 (1 YR)	1400 rat 2)316 2910 rat 4)298	Potent narcotic with long-duration effects. CNS depressant. Possible cumulative effects LC50:8000 ppm/4H, ihl-rat LCLo:2000 ppm, ihl-mus	USOS air: TWA 50 ppm (skn) or 245 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Sulfonation (Toluene, sulfuric acid, caustic soda)	80	**Air & Water:** Sulfuric acid and cresol **Water:** Flow (10.8 l/kg) COD (23,800 mg/l) (256 g/kg/ BOD_5 (11,400 mg/l) (123 g/kg) TOC (5,020 mg/l) (54 g/kg)				1)213
Oxidation (p-cymene, caustic soda, sulfuric acid)		**Air:** p-cymene, acetone **Water:** p-cresol, acetone, sodium hydroxide				1)215
Dehydration (Acetaldehyde, caustic soda, acetic or phosphoric acid)	87	**Water:** acetaldehyde, acetadol, crotonaldahyde, byproducts **Emission factors:** acetaldehyde - 1.00	Heavy ends incinerated	—	Intermediate for n-butyl alcohol & 2-ethyl-hexyl alcohol; solvent; preparation of rbr accelerators; purification of lubricating oils; insecticide; tear gas; fuel-gas warning agent; organic synthesis; leather tanning; alcohol denaturant	1)243 2)314 3)521 12)
Oxidation (Crotonaldehyde, air, copper/cobalt acetate catalyst, solvent	98	—	—	—	Synthesis of resins, polymers, plasticizers, drugs; adhesive for bookbinding; sizing & sealing of wood; molding; drying oil; fungicide; coatings	1)266 2)314 3)521 7)6-167
Alkylation (Benzene, propylene, phosphoric acid catalyst)	36	**Water:** 1-4% of the product steam **Air:** Cumene, acetone, trace mesityl oxide	—	1210/1973 1325/1974 895/1975 1482/1978	**Synthesis:** 65% phenol, 34% acetone, 1% alphamethylstyrene, cumene hydroperoxide; solvent blending of fuels	1)120 2)316 3)522 4)298 5)560 6)650 7)6-546 13)32

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
117	Cumene hydroperoxide (Hydroperoxide, α,α-dimethylbenzyl) $(CH_3)_2C(C_6H_5)OOH$ $(C_9H_{12}O_2)$	000080159 (QOXR)	382 rat LDLo:5000 mus	LC50:220 ppm/4H, ihl-rat LD50:95 mg/kg, ipr-rat LD50:400 mg/kg, scu-rat LD50:200 ppm/4H, ihl-mus LDLo:90 mg/kg, ipr-mus	—	TDLo:304 mg/kg, TFX:NEO, ihl-mus TDLo:10 gm/kg/76WI, TFX:NEO, scu-mus
118	Cyanoacetic acid (Acetic acid, cyano-) $CNCH_2COOH$ $(C_3H_3NO_2)$	000372098 (QV1CN)	—	Highly toxic LD50:200 mg/kg, ipr-mus LDLo:2000 mg/kg, scu-rbt	—	—
119	Cyanogen chloride CNCl (CClN)	000506774 (G CN)	—	TCLo:10 mg/m^3 ihl-hmn Highly toxic LC50:118 ppm/30M, ihl-rat LC50:117 ppm/30M, ihl-mus LDLo:39 mg/kg, scu-mus LCLo:800 mg/m^3/7.5M, ihl-dog LDLo:5 mg/kg, scu-dog LDLo:20 mg/kg, scu-rbt	—	—
120	Cyanuric acid (S-Triazine-2,4,4-triol) $(C_3H_3N_3O_3)$	000108805 (T6N CN ENJ BQ DQ FQ)	LDLo:500 rat	Highly toxic	—	TDLo:55 gm/kg/82WI TFX:NEO, orl-rat TDLo:27 gm/kg/2 YI TFX:NEO, scu-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Oxidation, Peroxidation (Cumene, air sodium carbonate, sodium stearate)	294	**Water: Plant 1:** Flow - 2.33 x 10^{-3} m^3/kg COD - 4,700 mg/l 11.1 g/kg BOD_5 - 2,410 mg/l 5.6 g/kg TOC - 194 mg/l 0.45 g/kg **Plant 2:** Fow - 1.37 x 10^{-3} m^3/kg COD - 84,304 mg/l 11.4 g/kg BOD_5 - 17,575 mg/l 24 g/kg TOC - 77,406 mg/l 105.6 g/kg	——	——	Production of acetone & phenol; polymerization catalyst, particularly in redox systems, used for rapid polymerization	1)697 2)471 3)523
Substitution (Sodium salt of chloroacetic acid, sodium cyanide)	111	**Water:** chloroacetic acid, sodium cyanide, cyanoacetic acid, byproducts	——	——	Organic synthesis	1)296 2)18 3)526
Chlorination (Hydrogen cyanide, chlorine)	168	**Air:** chlorine, HCN, NCCl **Water:** hydrogen cyanide, NaOH, NaCl	——	——	Organic synthesis; tear gas; warning agent in fumigant gases	1)428 2)317 3)527
Thermal decomposition, condensation (Urea)	186	**Air:** ammonia **Water:** solvents, acids, byproducts	——	——	Organic synthesis	1)467 2)927 3)528

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
121 DP	Cyanuric chloride (S-Triazine-2,4,6-trichloro-) ($C_3Cl_3N_3$)	000108770 (T6N CN ENJ BG DG FG)	485 rat	Irr to mucous mem; causes heart erhythmia in hmns	––	TDLo:18 mg/kg/73W, TFX:NEO, unk-rat TDLo:22 gm/kg/82WI, TFX:NEO, orl-rat TDLo:750 mg/kg/15WI TFX:NEO, scu-rat
122	Cyclohexane (C_6H_{12})	000110827 (L6TJ)	29,820 rat 1297 mus LDLo:5500 rbt	LDLo:500 mg/kg orl-hmn skn irr asphyxiant LDLo:77 mg/kg, ivn-rbt	USOS air: TWA 300 ppm or 1050 mg/m^3	––
123	Cyclohexanol $C_6H_{11}OH$ ($C_6H_{12}O$)	000108930 (L6TJ AQ)	2060 rat LDLo:1300 dog LDLo:2200 rbt	LDLo:500 mg/kg, orl-hmn TCLo:75 ppm, TFX:IRR, ihl-hmn Narcotic; kidney, liver & blood vessel damage in experimental animals LCLo:800 mg/kg, scu-cat LDLo:1420 mg/kg, ipr-rbt	USOS air: TWA 50 ppm or 200 mg/m^3	Suspected carinogen
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
124 DP	Cyclohexanone $CO(CH_2)_4CH_2$ ($C_6H_{10}O$)	000108941 (L6VTJ)	1620 rat LDLo:1300 mus LDLo:1600 rbt	TCLo:75 ppm, TFX:IRR, ihl-hmn Death after long exposure. Irr to eyes & throat; mild narcotic LCLo:2000 ppm/4H, ihl-rat	USOS air: TWA 50 ppm or 200 mg/m^3	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Trimerization (Cyanogen chloride)	169	**Air:** cyogen chloride, byproducts	—	—	Chemical synthesis; dyestuffs; pharmaceuticals; explosives; surfactants	1)430 2)927 3)528 8)312
Hydrogenation (Benzene, hydrogen, Pt or Ni catalyst with Li salt on alumina)	44	**Air:** benzene, hydrogen, sulfur, CO **Water:** COD given **Emission factors:** CO - 25.0, hydrocarbons - 20.0, SO_2 - 2.0	Solvent extraction columns and strippers	965/1973 1063/1974 1061/1978	Manufacturing: 48% nylon 66, 18% caprolactam; solvent for cellulose ethers, fats, oils, waxes, bitumens, resins, crude rubber; extracting essential oils; chemicals (organic synthesis, recrystallizing medium); paint & varnish remover	1)137 2)319 3)529 5)560 6)6208 12) 13)32
Oxidation (Cyclohexane, air, boric acid or cobalt naphthenate catalyst)	46	**Air:** cyclohexane, residual crude, catalyst salts	—	325.5/1968	Manufacturing: 90% adipic acid for nylon; soap making; solvent for phenolic insecticides; textile finishing solvent; blending agent; solvents for lacquers; paints & varnishes; finish removers; dry cleaning; emulsified products; leather degreasing; polishes; plasticizers; plastics; germicides	1)143 2)326 3)529 5)560
Hydrogenation (Phenol, hydrogen, benzaldehyde, sodium hydroxide	304	**Air:** phenol, cyclohexanol, cyclohexanone **Water:** NaOH, benzaldehyde, cyclohexanone, condensation products	—	Ditto	Ditto	1)717
Oxidation (Cyclohexanol, air, cobalt naphthenate catalyst)	46	See Cyclohexanol	—	289.7/1973	Organic synthesis: particularly of adipic acid & caprolactam (about 95%); polyvinyl chloride & its copolymers, & methacrylate ester polymers; solvent for DDT in aerosol bombs; general	1)143 2)327 3)529 5)560 6)621 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
124 (Continued) DP				LD50:1350 mg/kg, ipr-mus LDLo:630 mg/kg, ivn-dog LD50:1000 mg/kg, skn-rbt		
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
125	Cyclohexene $CH_2CH_2CH_2CH_2$ CHCH (C_6H_{10})	000110838 (L6UTJ)	—	—	USOS air: TWA 300 ppm or 1015 mg/m^3	—
126 DP	Cyclohexylamine ($C_6H_{13}N$)	000108918 (L6TJ AZ)	710 rat	LDLo:50 my/kg, orl-hmn Dermatitis & convulsions LCLo:8000 ppm/4H, ihl-rat LD50:200 mg/kg, ipr-rat LD50:300 mg/kg, ipr-mus LD50:320 mg/kg, skn-rbt	USOS air: TWA 10 ppm (skn) or 40 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
					wood stains; paint & varnish removers; spot & stain removers; degreasing of metals; in polishes; leveling agent in dyeing & delustering silk; lube oil additive; general solvent	
Oxidation (Cyclohexanol, air, copper catalyst)	305	**Air:** Cyclohexane, cyclohexanol, cyclohexanone **Water:** NaOH, dissolved organics	––	See item above	Ditto	1)719
Hydrogenation (Phenol, Pd on carbon catalyst)	306	**Air:** cyclohexanol, cyclohexanone **Water:** phenol, cyclohexanol, cyclohexanone **Emission factors:** CO - 1115, hydrocarbons - 100.7	Scrubber	Ditto	Ditto	1)720
Dehydration or halogenation and dehydrohalogenation (Cyclohexanol and Al_2O_3 or H_3PO_4 catalyst or cyclohexanol or cyclohexene, halogen and zeolite/alkali oxide catalyst)	47	—	––	965/1973 1068/1974 805/1975	Inorganic synthesis; catalyst solvent; oil extraction	1)145 2)328 3)530 5)560
Reduction (Aniline, hydrogen, Ru or Raney nickel catalyst)	20	**Air:** aromatics, hydrogen **Emission factors:** cyclohexanol - 1.0	––	––	Boiler-water treatment; corrosion inhibitor in boilers; rubber accelerator; intermediate	1)85 2)329 3)530 5)560 12)
Reduction amination (Cyclohexanone, ammonia, hydrogen, Ni catalyst)	48	**Air:** hydrocarbons **Water:** nickel compounds	––	––	Ditto	1)147

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
127	Decahydronaphthalenes (Naphthalene, decahydro-) ($C_{10}H_{18}$)	000091178 (L66TF)	4170 rat	TCLo:100 ppm TFX:IRR, ihl-hmn Irr to eyes, skn, & muc mem. Kidney damage in experimental animals LCLo:500 ppm/2H, ihl-rat	—	—
128	Decanol (n-decyl alcohol) $CH_3(CH_2)_8CH_2OH$ ($C_{10}H_{22}O$)	000112301 (Q10)	4720 rat	Unknown Experimental animals suggest low toxicity LC50:4000 mg/m^3, ihl-mus	—	TDLo:12 gm/kg/52WI TFX:CAR, skn-mus
129	Diacetone alcohol (2-Pentanone, 4 hydroxy-4-methyl-) $CH_3COCH_2C(CH_3)_2OH$ ($C_6H_{12}O_2$)	000123422 (QX1V1)	4000 rat	TCLo:100 ppm TFX:IRR, ihl-hmn Irr to eyes & muc mem; narcotic in high concen Causal anemia & damage to liver & kidneys of experimental animals LD50:933 mg/kg, ipr-mus	USOS air: TWA 50 ppm or 240 mg/m^3	—
—	Diaminobenzenes (see 334-336)	—	—	—	—	—
130G	Diaminobenzoic acid	(ZR XZ XVQ)	—	—	—	—
130	(Benzoic acid, 3,5-diamino-) $C_7H_8N_2O_2H_2O$ ($C_7H_8N_2O_2$)	027576041 (ZR CZ EVQ)	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Hydrogenation (Naphthalene, hydrogen, Cu or Ni catalysts)	216	**Air:** hydrogen, naphthalene, hydrogenated naphthalenes **Emission factors:** CO - 3.0, hydrocarbons - 2.0	—	—	Solvent for oils, fats, waxes, resins, rubber, etc.; substitute for turpentine; cleaning machinery; stain-remover; shoe creams, floor waxes, etc.; cleaning fluids; lubricants	1)531 2)571 3)536 12)
—	None	—	—	—	Plasticizers; deterigents; synthetic lubricants; solvent; perfumes; flavorings; softner for compounding rubber	2)339 3)536 7)1-557
Aldol condensation (Acetone, alkali or alkaline earth catalyst)	257	**Air:** acetone, diacetone alcohol	—	—	Solvent for nitrocellulose, cellulose acetate, various oils, resins, waxes, fats, dyes, tars; lacquers; dopes; coating composition; wood preservatives; stains; rayon & artifical leather; imitation gold leaf; dyeing mixtures; antifreeze mixtures; extraction of resins & waxes; preservative for animal tissues; metal-cleaning compounds; hydraulic compression fluids; stripping agent (textiles); laboratory reagent; the technical grade, containing acetone, has greater solvent power	1)627 2)621 3)539 5)560
—	—	—	—	—	—	—
—	—	—	—	—	—	—
Reduction (3,5-Dinitrobenzoic acid, hydrogen, Pd, Cu, Pt or Ni catalyst)	328	**Air:** low boiling organic nitrates **Water:** reactant and product	—	—	—	1)765 3)541

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
—	Diaminotoluenes (2,4 and 2,6), see 382	—	—	—	—	—
131G DP	Dichloroanilines (2,5 and 3,4 isomers) (8 isomers possible)	(ZR XG XG)	—	—	—	—
131	Aniline, 3,4-dichloro- $Cl_2C_6H_3NH_2$ $(C_6H_5Cl_2N)$	000095761 (ZR CG DG)	648 rat 740 mus	TCLo:0.025 mg/kg TFX:EYE, ihl-hmn Forms methemoglobin with anoximia & CNS depression; possible blood pressure lowering & cardiac arrhythmia LD50:700 mg/kg, skn-cat	—	—
132	Aniline, 2,4-dichloro-	000554007 (ZR BG DG)	LDLo:113 cat	Forms methemoglobin with anoximia & CNS depression; possible blood pressure lowering & cardiac arrhythmia	—	—
133G	Dichlorobenzenes (o, p)	(GR XG)	—	—	—	—
133 DP	o-Dichlorobenzene (benzene, o-dichloro)	000095501 (GR BG)	500 rat 500 rbt LDLo: 2000 gpg	LDLo:500 mg/kg, orl-hmn Irr to skn & muc mem. Liver & kidney damage produced experimentally LCLo:821 ppm/7H, ihl-rat	USOS air: TWA CL 50 ppm or 300 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
—	—	—	—	—	—	—
Reduction (Dichloro-nitrobenzene, iron, HCl)	11	**Water: acid**	—	—	Dye intermediate; intermediate for biologically active compounds; herbicides	1)71 2)95 3)557
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
—	—	—	—	—	—	2)94 3)557
Chlorination (Chlorobenzene, ferric chloride, chlorine)	5	**Emission factors:** benzene - 22.6, chlorobenzene - 1.3 p-dichlorobenzene - 0.05 o-dichlorobenzene - 0.05	—	63.4/1972 30.0/1973	Solvent for organic material & for oxides of nonferrous metals; fumigant & insecticides, degreasing hides & wool; metal polishes, industrial odor control; germicide space odorant; manufacture of 2,5-dichloroaniline; dyes; intermediates, pharmaceuticals, agricuture (fumigating soil)	1)57 2)159 3)557 5)560 9)22
Ditto	Ditto	Ditto	—	Ditto	53% organic synthesis, mainly 3,4-dichloroaniline; 20% solvent, toluene diisocyanate synthesis; 15% solvent (paint remover, engine cleaner); 8% dye manufacturing; 4% other, e.g., pesticide manu manufacturing.	2)159 3)557 12) 13)33

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
133 (Continued) DP				LDLo:400 mg/kg ivn-mus LDLo:250 mg/kg, ivn-rbt LCLo:800 ppm/24H, ihl-gpg		
134 DP	p-Dichlorobenzene ($C_6H_4Cl_2$)	000106467 (GR DG)	500 rat 2950 mus LDLo:2500 gpg	TDLo:300 TFX: UNS, orl-hmn LD50:2500 mg/kg, ipr-rat	USOS air: TWA 75 ppm or 450 mg/m^3	TDLo:142 mg/kg/I, TFX:CAR, scu-mus
—	m-Dichlorobenzene	—	—	—	—	—
135	Dichlorodifluoromethane (Methane, dichlorodifluoro-) Freon 12 (CCl_2F_2)	000075718	—	Narcotic in high concentrate	USOS air: TWA 1000 ppm	—
—	1,2-Dichloroethane, see 204					
136	1,2-Dichloroethylene, cis	000540590 (G1U1G)	—	Narcotic & irr produced liver & kidney injury in experimental animals	USOS air: TWA 200 ppm	—
—	1,2-Dichloroethylene, trans	—	770 rat	TCLo:4800 mg/m^3/10M TFX:CNS, ihl-hmn	—	—
—	1,1-Dichloroethylene, see 405					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
See item above	5	See item above	—	28.5/1973	50% space deodorant; 40% moth control; synthesis 2,5-dichloroaniline; miscellaneous	1)57 2)159 3)557 5)560 6)617 8)52 9)22 13)33
Isomerization ($AlCl_3$ & HCl catalysts)	5A	—	—	—	—	1)57
Substitution, Fluorination (Carbon tetrachloride, SbF_3, HF, $SbCl_3$ catalyst)	163	**Water:** HCl, sodium hydroxide, HF **Air:** chlorofluorohydrocarbons **Emission factors:** Dichlorodifluoromethane - 5.0, CCl_4 - 4.0, HCl - 3.0, HF - 3.0, trichlorofluoromethane - 1.0	—	222/1973 233.8/1974	52% aerosols, 29% refrigerants, 9% foam blowing agent	1)417 2)537 3)560 6)631B 12) 13)33
—	—	—	—	—	Low temperature & special purpose solvent, e.g., extraction of heat sensitive substances	3)561 5)560
—	—	—	—	—	—	—

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
137	Dichloroethyl ether (Ether, bis(2-chloroethyl) $ClCH_2CH_2OOH_2CH_2Cl$ ($C_4H_8Cl_2O$)	000111444 (G202G)	75 rat 4)352 105 rat 2)410	Irr to muc mem of the eyes & nose; mild narcotic; effects kidneys & liver in varying degree LCLo:1000 ppm/45M, ihl-rat LD50:300 mg/kg, skn-gpg	USOS air: CL 15 ppm (skn) or 90 mg/m^3	TDLo:33 gm/kg/79 WIC, TFX:CAR, orl-mus
—	Dichloromethyl ether, see 26ADD	000542881 (G101G)	210	—	USOS; carcinogen	Known carcinogen
138	Dichlorohydrin (2-Propanol, 1,3-dichloro-) $CH_2ClCHOHCH_2Cl$ ($C_3H_6Cl_2O$)	00096231 (G1YG1G)	490 rat	Irr to muc mem LCLo:125 ppm/4H, ihl-rat LD50:800 mg/kg, skn-rbt	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
—	Dichloronitrobenzenes (3,4- and 2,5-dichloro-1-nitrobenzene), (see also Items 284 and 286, Table B-2, Dye Intermediates)	—	1210 rat (2,5 isomer)	—	—	—
139	Dichloropentanes (Pentane, 1,5-dichloro-) ($C_5H_{10}Cl_2$)	000628762	—	Unknown	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
Chlorination (Ethyl ether, chlorine, catalyst)	142	**Air:** ethyl ether, chlorine, HCl, dichloroethyl ether	HCl scrubber	—	Soil fumigant; general solvent; selective solvent for production of high-grade lubricating oils; textile scouring & cleansing; fulling compounds; wetting & pentrating compounds; organic synthesis; paints, varnishes, lacquers, finish removers; spotting & dry cleaning; war gas	1)369 2)410 3)562 4)352 5)560 7)8-477
Substitution, Chlorination (Glycerol, HCl, 4% acetic acid)	253	**Water:** acetic acid, acetates, dichlorohydrin, halides	—	—	General solvent; intermediate in organic synthesis; paints, varnishes, lacquers, celluloid cements; water colors' binder; photo lacquers	1)620 2)759 3)566
Chlorination (Allyl alcohol, chlorine)	290	**Air:** allyl alcohol, chlorine, dichlorohydrin, propylene dichloride	—	—	Ditto	1)689
Addition, chlorohydrination (Allyl chloride, chlorine)	290	**Air:** allyl chloride, chlorine, dichlorohydrin, propylene dichloride	—	—	Ditto	1)689
Nitration (1,2- and 1,4-dichlorobenzene, nitric acid, sulfuric acid)	10	**Water:** Chlorinated benzenes, chloronitro phenols, acids	—	—	Dye intermediates	1)68 2)159
See amyl chlorides	242	—	—	—	Solvent for oils, greases, rubber, resins & bituminous material; removal of tar; reclaiming rubber; paint & varnish removers; degreasing of metals; insecticide; soil fumigant; removal of wax deposits on oil-well equipment	1)588 3)564

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
140G	Dichloropropenes (5 isomers)	001319682 (201 YG YG)	—	—	—	—
140	1,3-Dichloropropene (Propene, 1,3-Dichloro-) $CHClCClCH_3$ $(C_3H_4Cl_2)$	000542756	250 rat	Narcotic; degenerative changes in liver & kidneys LDLo:260 ppm, ihl-rat	—	—
141	Dicyclohexylamine (Hexylamine, dicyclo-) $(C_6H_{11})_2NH$ $(C_{12}H_{23}N)$	000101837 (L6TJ A- 2M)	373 rat LDLo:500 mus	LDLo:50 mg/kg, orl-hmn Local irr & nervous excitement in experimental animals LD50:135 mg/kg, scu-mus	—	TDLo:2404 mg/kg/48 WI, TFX:NEO, scu-mus TDLo:2400 mg/kg/44 W, TFX:CAR, scu-mus
	—	—	—	—	—	—
142 DP	Diethanolamine (Ethanol, 2,2'-iminodi-) $(HOCH_2CH_2)_2NH$ $(C_4H_{11}NO_2)$	000111422 (Q2M2Q)	710 rat	LD50:2300 mg/kg, ipr-mus LD50:3553 mg/kg, scu-mus	—	—
143 DP	Diethylamine $(C_2H_5)_2NH$ $(C_4H_{11}N)$	000109897 (2M2)	540 rat 649 mus	LC50:4000 ppm/4H, ihl-rat LD50:820 mg/kg, skn-rbt	USOS air: TWA 25 ppm or 75 mg/m^3	—
144	Diethylene glycol $CH_2OHCH_2OCH_2$ CH_2OH $(C_4H_{10}O_3)$	000111466 (Q2O2Q)	9000 dog 3300 cat 14800 rat 23700 mus	LD50:1000 mg/kg, orl-hmn LD50:2000 mg/kg, irn-rbt LDLo:130 mg/m^3, ihl-mus	—	Suspected carcinogen of the bladder 3)575

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production kg/year	Uses	References
—	—	—	—	—	—	—
Chlorination See allyl chloride (Propylene, chlorine)	323	Air: Propylene **Water:** Caustic soda	Absorber	—	Organic synthesis; soil fumigants	1)750 2)765 3)567
Hydrogenation (Aniline, hydrogen, Ni catalyst)	49	Air: Hydrocarbons	—	—	Intermediate; insecticide; plasticizer; corrosion inhibitor; antioxidants in rubber; lubricating oils, fuels; catalysts for paint, varnishes & inks; detergents; extractant in medicine; soaps & detergents in textiles & printing	1)149 2)362 3)568 7)2-125 8)130 9)130
See cyclohexylamine	48	—	—	—	—	1)147
Ammonolysis, Amination (Ethylene oxide, ammonia)	152	Air: ammonia, various ethanolamines	—	50.4/1974 48.3/1973	Liquid detergents for emulsion paints, cutting oils, shampoos, cleaners, & polishers; textile specialties; absorbent for acid gases; chemical intermediate for resins & plasticizers, etc.; solubilizing 2,4-D	1)386 2)406 3)571 6)622
Amination (Ethyl alcohol, ammonia)	120	Air: ammonia, ethyl alcohol, ethylamines **Water:** organic & inorganic ammonia salts & above **Emission factors:** hydrocarbons - 2.0, NH_3 - 2.0	Stripper	5/1972	Rubber chemical; textile specialties; selective solvent; dyes; flotation agents; resins; pesticides; polymerization inhibitor; pharmaceuticals; petroleum chemicals; electroplating; corrosion inhibitor	1)316 2)365 3)572 5)560 7)2-123 12)
Hydration (Ethylene oxide, water, H_2SO_4 catalyst is optional)	144	Air: ethylene glycol, ethylene oxide, aldehydes **Water:** Flow - 4.873 m^3/Mg COD - 8.66 kg/Mg	—	122.0/1973 140.5/1974	Manufacturing: 30% polyurethane & unsaturated polyester resins, 13% triethylene glycol, 12% textile softener, 7% petroleum solvent extractions, 7%	1)374 2)365 3)575 6)628 7)8-553 12) 13)33

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
144 (Continued)						
	Ditto	Ditto	Ditto	Ditto	—	Ditto
145	Diethylene glycol dibutyl ether (Ether, bis(2-butoxy-ethyl)) (Dibutyl Carbitol) $C_4H_9O(CH_2CH_2O)_2C_4H_9$ ($C_{12}H_{26}O_3$)	000112732 (4020204)	3900 rat	Unknown	—	—
146	Diethylene glycol diethyl ether Ether, bis (2-ethoxyethyl) Diethyl Carbitol $(C_2H_5OCH_2CH_2)_2O$ ($C_6H_{18}O_3$)	000112367 (2020202)	4970 rat 1850 gpg	Unknown	—	—
147	Diethylene glycol dimethyl ether (Ether, bis(2-methoxyethyl-)) (Dimethyl Carbitol) $CH_3O(CH_2CH_2O)_2CH_3$ ($C_6H_{14}O_3$)	000111966 (1020201)	—	—	—	—
148	Diethylene glycol monobutyl ether (Ethanol, 2(2-butoxy-ethoxy)) (Butyl Carbitol) $C_4H_9OCH_2CH_2OCH_2CH_2OH$ ($C_8H_{18}O_3$)	000112345 (Q20204)	6560 rat 2000 gpg	LDLo:500 mg/kg, orl-hmn LD50:850 mg/kg, ipr-mus LD50:4120 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
		BOD - 0.34 kg/Mg TOC - 4.53 kg/Mg			dehydration of natural gas, 7% plasticizers & surfactants, solvent for nitrocellulose, & many dyes & oils; humectant for tobacco, casein, synthetic sponges, paper products; cork compositions; book binding adhesives; dyeing assistant; cosmetics; lubricants; brake fluids; printing inks; low-pressure laminates	
Condensation & reduction (Formaldehyde, CO, water, BF_3 & CuO+MgO catalysts)	203	Air: CO Water: Glycolic acid, formaldehyde, methanol, higher alcohols, organic acids	—	—	Ditto	1)504
Alkoxylation (Mono-, di-, or triethylene glycol monoether, sodium salt, alkyl chloride)	150	Water: NaCl, alkyl chlorides, other	—	—	High-boiling, inert solvent with application in extraction processes & in coatings & inks; diluent in vinyl chloride dispersions; extractant for uranium ores	1)384 2)410 3)575
See diethylene glycol dibutyl ether	150	—	—	—	Solvent for nitrocellulose; resins, lacquers; high-boiling medium & solvent for organic synthesis	1)384 2)411 3)575
Ditto	Ditto	—	—	—	Solvent; anhydrous reaction media for organic metallic synthesis	1)384 3)575
Alkoxylation (Ethylene oxide, alcohols)	149	Water: ethylene oxide, ethylene, higher polyglycols, alcohols, glycol monoethers	—	11.5/1973	Manufacturing: Acetate ester for solvent use; coalescing agent latex paint; solvent for nitrocellulose, oils, dyes, gums, soaps, polymers; plasticizer intermediate	1)381 2)401 3)444 6)636 13)34

(Continued).

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
149	Diethylene glycol monobutyl ether acetate (Ethanol, 2- (2-butoxy-ethoxy)-acetate) (Butyl Carbitol acetate) $C_4H_9O(CH_2)_2O(CH_2)_2OOCCH_3$ $(C_{10}H_{20}O_4)$	00012174 (402020V1)	6500 rat 2)401 12,000 rat 3)444 6600 mus 2600 rbt 2340 gpg 5000 ckn	LD50:15,000 mg/kg, skn-rbt	—	—
150	Diethylene glycol monoethyl ether (Ethanol, 2(2-ethoxy-ethoxy) (Carbitol) $C_2H_5OCH_2CH_2OCH_2CH_6OH$ $(C_6H_{14}O_3)$	000111900 (Q20202)	6500 rat 3620 rbt 3670 gpg	LDLo:500 mg/kg, orl-hmn LDLo:2000 mg/kg, scu-rat LDLo:2400 mg/ kg, ivn-rat LD50:5638 mg/kg, scu-mus LD50:3900 mg/kg, ivn-mus	—	—
151	Diethylene glycol monoethyl ether acetate (Ethanol, 2-(2-ethoxy ethoxy)-acetate) (Carbitol acetate) $C_2H_5O(CH_2)_2O(CH_2)_2OOCCH_3$ $(C_8H_{16}O_4)$	000112151 (202020V1)	3930 gpg 11,000 rat	LDLo:500 mg/kg, orl-hmn	—	—
152	Diethylene glycol monohexyl ether (Ethanol, 2(2-hexyl-oxy)ethoxy-1) (Hexyl Carbitol) $C_6H_{13}O(CH_2)_{\dagger}O(CH_2)_2OH$ $(C_{10}H_{22}O_3)$	000112594 (Q20206)	4920 rat	LD50:1500 mg/kg, skn-rbt	—	—
153	Diethylene glycol monohexyl ether ac acetate (Ethanol, 2[2-[2-(hexyloxy ethoxy acetate) (Hexyl Carbitol acetate) $C_6H_{13}O(CH_2)_2O(CH_2)_2OOCCH_3$	025961891 (202060V1)	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Esterification (Mono- or diethylene glycol monoether, acetic acid)	151 (see also 145)	Water: Reactants and products	Separator	—	Solvent for oils, resins, gums, also for cellulose nitrate & polymeric coatings; plasticizers in lacquers & coatings	1)385 2)401 3)444
See diethylene glycol monobutyl ether	149	—	—	12.6/1973	Brake fluid diluent; coatings solvent; textile printing & drying solvent; cosmetics & toiletries solvent; solvent for dyes, nitrocellulose, & resins; nonaqueous stains for wood; for setting the twist & conditioning yarns & cloth; textile soaps; organic synthesis	1)381 2)405 3)468 6)636 13)34
See diethylene glycol monobutyl ether acetate	151	—	—	—	Solvent for cellulose esters, gums, resins; coatings & lacquers; printing inks	1)385 2)405 3)468
See Diethylene glycol monobutyl ether	149	—	—	—	—	1)381 2)406
See diethylene glycol monobutyl ether acetate	151	—	—	—	—	1)385

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
154	Diethylene glycol monomethyl ether (Ethanol, 2(2-methoxyethoxy)-) (Methyl Carbitol) $CH_3OCH_2CH_2OCH_2CH_2OH$ ($C_5H_{12}O_3$)	000111773 (Q20201)	4160 gpg 9210 rat	LD50:650 mg/kg skn-rbt	—	—
155	Diethylene glycol monomethyl ether acetate (Ethanol, 2(2-methoxyethoxy)-acetate) (Methyl Carbitol Acetate) $CH_3O(CH_2CH_2O)_2OCCH_3$ ($C_7H_{14}O_4$)	000629389 (1V020201)	3460 gpg	—	—	—
156	Diethyl sulfate (Sulfuric acid, diethyl ester) $(C_2H_5)_2SO_4$ ($C_4H_{10}O_4S$)	000064675 (20SW02)	647 mus LDLo:750 rat	TDLo:85 mg/kg (15D Preg), TFX:TER, ivn-rat LCLo:250 ppm/4H, ihl-rat LD50:350 mg/kg, scu-rat LD50:340 mg/kg, ivn-rat	—	TDLo:85 mg/kg (15D preg), TFX:CAR, ivn-rat TDLo:1900 mg/kg/81WI, TFX:CAR, orl-rat TDLo:800 mg/kg/49WI, TFX:NEO, scu-rat
157	Difluoroethane (Ethane, difluoro-) $F_2C_2H_4$ ($C_2H_4F_2$)	026497283 (FYF)	—	Irr to lungs; narcotic in high concentrate	—	—
158	Diisobutylene (Pentene, 2,4,4-trimethyl-) (C_8H_{16})	012002232 (1X1YU1)	—	Irr & narcotic in high concern; liver & kidney damage in experimental animals	—	—
159 DP	Diketene (2-Oxetanone, 4-methylene) ($C_4H_4O_2$)	003068880 (T4VOY DHJ CU1)	560 rat LDLo:800 mus	LCLo:20,000 ppm/1H, ihl-rat	—	—
160 DP	Dimethylamine $(CH_3)_2NH$ (C_2H_7N)	000124403 (1M1)	698 rat 316 mus 240 rbt 240 gpg	—	USOS air: TWA 10 ppm or 18 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See diethylene glycol mono-butyl ether	149	—	—	6.2/1973	Solvent; brake fluid component; intermediate	1)381 2)407 3)812 6)636
Ditto	151	—	—	—	Solvent	1)385 2)407 3)812
Esterification, Sulfation (Ethylene, 96% sulfuric acid)	125	**Water and Air:** ethanol, sulfuric acid, diethyl sulfate, mono-ethyl sulfate	—	—	Ethylating agent in organic synthesis	1)328 2)885 3)582 4)361 8)298
Hydrofluorination, Fluorination (Acetylene, HF BF_3 catalyst)	175	**Air:** acetylene, difluoroethane	—	—	32% Aerosol; 29% refrigerant; 9% foam blowing agent	1)443 3)583 13)34
Polymerization (Isobutylene, H_2SO_4)	75	**Water:** sodium hydroxide, sodium sulfate, butyl alcohol	—	—	Alkylation; intermediate; antioxidants; surfactants; lube additives; plasticizers; rubber chemical	1)200 2)622 3)590
Pyrolysis & Dimerization (Acetone or acetic acid)	263B (see also 263A & 105)	See Ketene (263)	—	—	Production of acetoarylamides; pigments & toners; pesticides; food preservatives; pharmaceutical intermediate	1)639 2)617 3)593
—	192	See Methylamine (276DP)	—	55.2/1973	23% manufacture dimethylformamide & dimethylacetamide, about 7% lauryl dimethylamine oxide (surfactant), about 7% rubber chemicals	1)481 2)367 3)595 5)560 9)200 13)34

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
160 DP	(Continued)					
161 DP	N,N-Dimethylaniline (Aniline, dimethyl) $C_6H_5N(CH_3)_2$ $(C_8H_{11}N)$	000121697 (1N1&R)	LDLo:1410 rat	LDLo:50 mg/kg, orl-hmn LD50:1770 mg/kg, skn-rbt CNS depressant	USOS air: TWA 5 ppm (skn) or 25 mg/m^3 (skn)	—
162	Dimethyl ether (Methyl ether) CH_3OCH_3 (C_2H_6O)	000115106 (1O1)	—	—	—	—
163	N,N-Dimethylformamide (Formamide, N,N-dimethyl) $(CH_3)_2NCHO$ (C_3H_7NO)	000068122 (VHN1&1)	2800 rat 1122 mus 4)376 3750 mus 2)429	LDLo:500 mg/kg, orl-hmn TCLo:20 ppm, TFX:CNS, ihm-hmn Highly irritating; prolonged ihl produced liver damage in experimental animals LD50:1260 mg/kg, ipr-rat LD50:3500 mg/kg, scu-rat LD50:2350 mg/kg, ivn-rat	USOS air: TWA 10 ppm (skn) or 30 mg/m^3 (skn)	—
164 DP	Dimethyl sulfate (Sulfuric acid, dimethyl ester) $(CH_3)_2SO_4$ $(C_2H_6O_4S)$	000077781 (1OSWO1)	440 rat	LDLo:97 ppm/10M, ihl-hmn Intense irr to skn & muc mem; frequent liver & kidney damage; death may be delayed for several weeks TDLo:20 mg/kg/(15D preg), TFX:TER, ivn-rat 2)lists this data as CAR	USOS air: TWA 1 ppm (skn) or 5 mg/m^3	TCLo:17 mg/m^3/18WI, TFX:CAR, ihl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					(antioxidants, accelerators); dyes; about 23% acid gas absorbent; solvent; solvent; flotation agent; gasoline stabilizers; pharmaceuticals; textile chemicals; electroplating; dehairing agent; missile fuels; rocket propellants	
Alkylation (Aniline, methanol)	13	**Water:** aniline	—	7.1/1973	Solvent; activator for polyesters; alkylating agent; dye intermediate; stabilizer (acid acceptor)	1)72 2)95 3)598 5)560 7)2-420 9)23
Condensation, Dehydration (Methanol, sulfuric acid or alumina catalyst)	196	**Water:** traces of ether aldehydes and peroxides	—	—	Refrigerant; solvent; extraction agent; propellant for sprays; chemical (reaction medium); catalyst & stabilizer in polymerization	1)491 2)550 3)605
Acylation (Methyl formate, dimethylamine)	200	**Air:** methyl formate, dimethylamine, methanol	—	—	Solvent for vinyl resins & acetylene, butadiene, acid gases; catalyst in carboxylation reactions; organic synthesis	1)496 2)429 3)606 4)376 5)560
Esterification, Sulfation (Dimethyl ether, liquid sulfur trioxide)	197	**Air:** SO_x **Water:** sulfuric acid, methyl hydrogen sulfate	—	—	Methylating agent for amines & phenols	1)493 2)885 3)613 5)560

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
164 DP	(Continued)			LCLo:32 ppm/4H, ihl-rat LD50:100 mg/kg, scu-rat LCLo:75 ppm/17M, ihl-mus		
165	Dimethyl sulfide (Methyl sulfide) $(CH_3)_2S$ (C_2H_6S)	000075183 (1S1)	535 rat 3700 mus	Unknown LD50:8000 mg/kg, ipr-mus	—	—
166	Dimethyl sulfoxide (Methyl sulfoxide) $(CH_3)_2SO$ (C_2H_6OS)	000067685 (0S1&1)	20,000 rat 21,000 mus	Freely penetrates skn; skn irr; causes nausea, chills, cramps, lithargy TDLo:5 gm/kg/ (6-12D preg), TFX:TER, orl-rat TDLo:8 gm/kg/ (6-12D preg), TFX:TER, ipr-rat TDLo:50 mg/kg/ (8D preg), TFX:TER, ivn-ham LD50:2500 ivn-dog	—	—
—	Dimethyl terephthalate, see 374					
167G	Dinitrobenzene (3 isomers)	—	—	Pathological effects; anemia; jaundice; enlarged liver or yellow atrophy, kidney degeneration; CNS injury	—	—
167	Benzene, m-dinitro	000099650 (WNR CNW)	42 bdw	TDLo:4 mg/kg/ 2 DI TFX:BLD, skn-man LDLo:27 mg/kg, orl-cat	USOS air: TWA 1 mg/m^3 (skn)	—
168	Benzene, p-dinitro	000100254 (WNR DNW)	LDLo:29 cat	—	USOS air: TWA 1 mg/m^3	—
169	Benzene, o-dinitro $C_6H_4(NO_2)_2$ $(C_6H_4N_2O_4)$	025550554 (ONR BNO)	29 cat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Substitution (Methanol, carbon disulfide, Al_2O_3 catalyst)	206	**Air:** carbon disulfide, methanol, methyl mercaptan, possible H_2S	—	—	Gas odorant; solvent for many inorganic substances; catalyst impregnator; synthetic flavor	1)510 2)550 3)832 7)9-354
Oxidation (Dimethylsulfide, nitrogen dioxide)	207	**Air:** CO_2, O_2, N_2, about 0.3% nitrogen oxides (NO_x)	—	—	Solvent for polymerization & cyanide reactions; analytical reagent; spinning polyacrylonitrile & other synthetic fibers; industrial cleaners pesticides, paint stripping; hydraulic fluids; preservation of cells at low temperatures; diffusion of drugs, etc., into blood stream by topical application; medicine; plant pathology & nutrition	1)511 2)550 3)613
Nitration (Nitrobenzene, sulfuric acid, nitric acid)	26	**Air:** NO_x (0.1 kg/Mg product) **Water:** may be some sulfuric acid, nitric acid, mono-, & dinitrobenzene	—	—	Organic synthesis; dyes; camphor substitute in celluloid production	1)100 2)160 3)616
—	—	—	—	—	—	2)160 3)616 5)560
—	—	—	—	—	—	Ditto
—	—	—	—	—	—	2)160 3)616

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
170G	Dinitrobenzoic acid (6 isomers) $(NO_2)_2C_6H_3CO_2H$ $(C_7H_4N_2O_6)$	015147645 (WNR XVQ XNW)	—	—	—	—
170	Benzoic acid, 2,4-dinitro	000610286 (WNR BVQ ENW)	—	—	—	—
	Benzoic acid, 2,6-dinitro	000528450 (WNR BVQ CNW)	—	—	—	—
	Benzoic acid, 2,3-dinitro	000610300 (WNR BVQ FNW)	—	—	—	—
	Benzoic acid, 2,5-dinitro	000603123 (WNR BVQ DNW)	—	—	—	—
	Benzoic acid, 3,4-dinitro	— (WNR CVQ FNW)	—	—	—	—
171	3,5-dinitro-benzoic acid (Benzoic acid, 3,5-dinitro-) $(NO_2)_2C_6H_3CO_2H$ $(C_7H_4N_2O_6)$	000099343 (WNR CVQ ENW)	—	—	—	—
172G	Dinitrotoluene (6 isomers)	— (WNR X XNW)	—	—	USOS air: TWA 1.5 mg/m^3 (skn)	—
172	Toluene, 2,3-dinitro $(NO_2)_2C_6H_3CH_3$ $(C_7H_6N_2O_4)$	— (WNR B FNW)	1122 rat	—	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (Toluene, nitric acid, sulfuric acid, chromic acid or sodium dichromate)	342	**Air:** NO_x **Water:** chromium or potassium salts, spent acid	—	—	—	1)789
Ditto	Ditto	Ditto	—	—	—	Ditto
Ditto	Ditto	Ditto	—	—	—	Ditto
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
Nitration (Benzoic acid, fuming nitric and sulfuric acids)	327	**Air:** SO_2, NO_x, CO_2 **Water:** nitric and sulfuric acids, benzoic acid, 3-nitrobenzoic acid, 3,5-dinitrobenzoic acid	—	—	—	1)764
Nitration (Toluene, nitric acid, sulfuric acid, nitrosylsulfuric acid)	340	**Water:** nitrated toluene **Air:** NO_x, nitrated toluenes **Emission factors:** Hydrocarbons - 1.0, NO_2 - 0.3	—	237.6/1974	Organic synthesis; toluidines; dyes; explosives	1)785 2)914 3)619 12)
—	—	—	—	—	—	2)914

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
173	Toluene, 2,4-dinitro	000121142 (WNR B ENW)	268 rat 1625 mus	Anemia, muthermoglobrinemia, cyanosic, & liver damage	See item above	—
174	Toluene, 2,5-dinitro	000619158 (WNR B DNW)	707 rat 1231 mus	—	Ditto	—
175	Toluene, 2,6-dinitro	000606202 (WNR B CNW)	177 rat 1000 mus	—	Ditto	—
—	Toluene, 3,4-dinitro	000610399	177 rat 1414 mus	—	Ditto	—
176	Dioxane (p-Dioxane) $OCH_2CH_2OCH_2CH_2$ ($C_4H_8O_2$)	000123911 (T60 DOTJ)	4200 rat 2)369 7100 rat 3)620 2000 cat 2000 rbt 3150 gpg	LDLo:500 mg/kg, orl-hmn TCLo:5500 ppm/1M TFX:EYE, ihl-hmn LCLo:470 ppm, TFX:UNS, ihl-hmn Irr to eyes & nose, followed by narcosis and/or pulmonaryedima & death LD50:790 mg/kg, ipr-mus	USOS air: TWA 100 ppm (skn) or 300 mg/m^3	TDLo:416 gm/kg/57WC, TFX:CAR, orl-rat
177	1,3-Dioxolane $OCH_2CH_2OCH_2$ ($C_3H_6O_2$)	000646060 (T50 COTJ BY BY D1Q)	3000 rat 7460 rat	LCLo:32,000 ppm/4H, ihl-rat	—	—
178 DP	Diphenylamine $(C_6H_5)_2NH$ ($C_{12}H_{11}N$)	000122394 (RNR)	LDLo:3000 rat	LDLo:500 mg/kg, orl-hmn TDLo:7500 mg/kg/(17-22D preg), TFX:TER, orl-rat	10 mg/m^3	Recognized carcinogen 3)622

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See item 172G	See Item 172G	See Item 172G	—	—	—	1)785 2)915
—	—	—	—	—	—	2)915
See Item 172G	See Item 172G	See Item 172G	—	—	—	1)785 2)915
—	—	—	—	—	—	2)915
Condensation, dehydration (Ethylene glycol, sulfuric acid)	146	**Water:** sulfuric acid, ethylene glycol, dioxane	—	7.4/1973	Solvent for cellulosics & wide range of organic products; lacquers; paints; varnishes; paint & varnish removers; wetting & dispersing agent in textile processing, dye baths, stain & printing compositions; cleaning & detergent preparation; cements; cosmetics; deodorants; fumigants; emulsions; polishing compositions; stabilizer for chlorinated solvent; scintillation counter	1)378 2)369 3)620 5)561 9)199
Condensation (Ethylene glycol, formaldehyde)	147	**Water:** formaldehyde, ethylene glycol, dioxolane	—	—	Low-boiling solvent & extractant for oils, fats, waxes, dyes, & cellulose derivatives	1)379 2)370 3)621
Condensation, Dimerization (Aniline, aniline hydrochloride)	34	—	—	15.7/1973	Rubber antioxidants & accelerators; stabilizers for plastics & azo-dyes; solid rocket propellants; pesticides; explosives; dyes; pharmaceuticals ; antheiminthia & insecticides	1)116 2)373 3)622 7)2-420 9)23 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
179	Diphenyl oxide (Phenyl ether) $(C_6H_5)_2O$ $(C_{12}H_{10}O)$	000101848 (ROR)	3370 rat	Chronic damage to liver, spleen, kidney, thyroid, & GI system; slight irr	USOS air: TWA 1 ppm or 7 mg/m^3	—
180	Diphenylthiourea (Carbanilide, thio) $C_6H_5NHC(S)NHC_6H_5$ $(C_{13}H_{12}N_2S)$	000102089 (SUYMR &MR)	1500 rbt LDLo:720 cat	Low toxicity LD50:500 mg/kg, ipr-mus	—	—
181	Dipropylene glycol (2-Propanol, 1,1'-oxydi) $(CH_3CHOHCH_2)_2O$ $(C_6H_{14}O_3)$	000110985 (QY&101 YQ)	15,000 rat	—	—	—
182	Dodecene (Propene, polymers, tetramer) $(C_{12}H_{24})$	006842155	—	Unknown	—	—
183 DP	Dodecyaniline (n-Dodecylaniline) $C_6H_5HNC_{12}H_{25}$ $(C_{18}H_{31}N)$	018686141 (ZR X12)	—	—	—	—
184G	Dodecylphenol (Phenol, dodecyl) $HOC_6H_4C_{12}H_{25}$ $(C_{18}H_{30}O)$	001331573 (QR X12)	2140 rat	LD:5000 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Substitution, Ullman reaction (Chlorobenzene, aqueous sodium hydroxide)	52	**Air:** Chlorobenzene, phenol **Water:** NaOH, NaCl, sodium phenoxide	—	—	Organic synthesis; perfumery, particularly soaps; heat-transfer medium; resins for laminated electrical insulation	1)153 3)625 5)625
Condensation, Acrylation (Aniline, carbon disulfide, alcohol, sulfur, dilute hydrochloric acid)	32	**Air:** Carbon disulfide **Water:** Aniline, aniline oxidation products, dilute acids and salts	—	—	Intermediates; dyes (sulfur colors, indigo, methyl indigo); vulcanization accelerator; synthetic organic pharmaceuticals; flotation agent; acid inhibitors	1)112 2)279 3)1027
Hydration (Propylene oxide)	287	**Water:** propylene oxide, propylene glycol	—	24.2/1973	Principally solvent unsaturated polyester resins; solvent for nitrocellulose; shellac; partial solvent for cellulose acetate; solvent mixtures; lacquers, coatings; printing inks	1)684 2)761 3)627 9)204 13)35
Oligomerization (Propylene/propane, phosphoric acid)	264	**Air:** propylene, nonene, dodecene, other olefins **Emission factors:** propylene - 10.0	—	—	Principally synthetic dodecybenzene; flavors; perfumes; medicine; oils; dyes; resins	1)640 2)765 3)633 12) 13)35
—	—	—	—	—	Intermediate	—
Alkylation (Phenol, dodecene)	313	**Water:** phenol, dodecylphenol	—	—	Solvent; intermediate for surface-active agents; oil additives; resins; fungicides; bactericides; dyes; pharmaceuticals; adhesives; rubber chemicals; household & industrial monionic detergents	1)731 2)645 3)633 7)1-909

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
185	Epichlorohydrin (Propane, 1-chloro-2,3-epoxy-) C_3H_5OCl (C_3H_5ClO)	000106898 (T30TJ B1G)	90 rat 238 mus LDLo:50 hmn	TDLo:20 ppm, TFX:EYE, ihl-hmn Acute poisoning; death may result from respiratory paralysis. Chronic poisoning results in kidney damage; irr to skn LCLo:250 ppm/4H, ihl-rat LC100:7400 ppm/30M, ihl-mus LD50:155 mg/kg, ipr-mus LD50:515 mg/kg, skn-rbt, 2)744 LD50:1300 mg/kg, skn-rbt, 3)641	USOS air: TWA 5 ppm (skn) or 19 mg/m^3	TDLo:19 mg/kg, TFX:NEO, ihl-mus TDLo:720 mg/kg/18WI, TFX:NEO, scu-mus
186	Ethane (C_2H_6)	000074840 (2H)	—	Simple asphyxiant	—	—
187 DP	Ethanol (Ethyl alcohol) CH_3CH_2OH (C_2H_6O)	000064175 (Q2)	21000 rat 6300 rbt 5560 gpg LDLo:2000 chd LDLo:500 hmn TDLo:50, TFX:GIT man TDLo:1.43 TFX:CNS man LDLo:220 mus LDLo:5500 dot LDLo:6000 cat LDLo:6300 rat	No cumulative effect; irr to eyes & muc mem of the upper respiratory tract; repeated ing can lead to chronic alcoholism TDLo:7500 mg/kg (9D preg) TFX:TER LD50:1440 mg/kg, ivn-rat	USOS air: TWA 1000 ppm or 1900 mg/m^3	TDLo:340 gm/kg/57WI, TFX:CAR, orl-mus TDLo:100 gm/kg/18WI, TFX:CAR, rec-mus
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10⁶ kg/year	Uses	References
Dehydrochlorination (Dichlorohydrin, calcium or sodium hydroxide, trichloropropane solvent)	291	**Air:** chlorine (1.0 g/Mg), HCl (1.0 kg/Mg), allyl chloride (4 kg/Mg), epichlorohydrin (1.5 kg/Mg), trichloropropane (0.5 kg/Mg), HCl (0.5 kg/Mg) **Emission factors:** Allyl chloride - 4.0	Tail gas absorber	229/1973 225/1974	Synthesis; about 32% glycerine, about 12% epoxy & phenoxy resins; synthesis epichlorohydrin elastomers; solvent for cellulose esters & ethers; high wet-strength resins for paper industry; starch modifier	1)692 2)744 3)641 5)561 7)10-17 12) 13)35
—	—	See butane	—	—	Commercial fuel; refrigerant; chemical manufacturing	3)721 7)8-385
Hydration (Ethylene, water, phosphoric acid on diatomite)	119	**Water:** (15-30) kg/COD/Mg **Air:** 1.1 kg/Mg ethanol, trace acetaldehyde, ether & ethylene **Emission factors:** 1.1 kg/Mg ethanol, trace acetaldehyde, ether & ethylene	—	890/1973 862.6/1974	Solvent for resins, fats, oils, fatty acids, hydrocarbons, alkali hydroxides; extractive medium, manufacture of intermediates, organic derivatives (especially acetaldehyde), dyes, synthetic drugs, elastomers, detergents, cleaning solutions, surface coatings, cosmetics, pharmaceuticals, explosives, anti-freeze; beverages; antiseptics, medicines	1)312 2)414 3)649 5)561 6)623 8)162 12)
See acetic acid	227	**Emission factors:** ethylene oxide - 10.0	—	Ditto	Ditto	1)560

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
188 DP	Ethanolamine (Ethanol, 2 amino) (Monoethanol amine) $NH_2CH_2CH_2OH$ (C_2H_7NO)	000141435 (Z2Q)	2100 rat	Large doses can cause alcohol poisoning; CNS depressant LD50:981 mg/kg, ipr-rat LD50:2537 mg/kg, scu-mus LD50:1000 mg/kg, skn-rbt	USOS air: TWA 3 ppm or 6 mg/m^3	—
189	Ethyl acetate (Acetic acid, ethyl ester) $CH_3COOC_2H_5$ ($C_4H_8O_2$)	000141786 (2OV1)	1100 rat-rbt 4935 rbt LDLo:500 hmn	TCLo:400 ppm TFX:IRR, ihl-hmn Irr to muc surfaces, eyes, gums & respiratory tract; mild narcotic LC50:1600 ppm, ihl-rat LD50:5000 mg/kg, scu-rat LCLo:31 mg/m^3/60 M, ihl-mus LD50:709 mg/kg, ipr-mus LD50:3000 mg/kg, scu-cat	USOS air: TWA 400 ppm or 1400 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
190	Ethyl acetonacetate (Acetoacetic acid, ethyl ester) $CH_3COCH_2COOC_2H_5$ ($C_6H_{10}O_3$)	000141979 (2OV1V1)	3980 rat	—	—	—
191	Ethyl acrylate (Acrylic acid, ethyl ester) $CH_2CHCOOC_2H_5$ ($C_5H_8O_2$)	000140885 (2OV1U1)	1020 rat 400 rbt	TCLo:50 ppm TFX:IRR, ihl-hmn Oral administration can result in death; severe local irritation of the GI tract; toxic degenerative changes of cardiac, hepatic, renal, & splenic tissues; no evidence of cumulative effects	USOS air: TWA 25 ppm (skn) or 100 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See diethanolamine	152	**Air:** NH_3, traces of ethanolamines	Fractionating column, stripper	Mono- di- and tri- ethanol amines 141/1973 139/1974 165/1978	37% detergents; 22% gas conditioning & petroleum use; 5% synthetic morpholine; 20% exports; 16% miscellaneous including polishes & herbicides	1)386 2)400 3)839 5)561 12) 13)35
See acetic acid	227	**Emission factors:** ethanol - 5.0, ethyl acetate - 5.0	—	100/1973 89/1974 103/1978	70% solvent in coatings; 10% solvent in plastics; 17% solvent in lacquers, thinners & dyes; organic synthesis, pharmaceuticals, smokeless powders	1)560 2)26 3)648 12) 13)35
Esterification (Ethanol, acetic acid, sulfuric acid)	103	**Water:** sulfuric acid	—	—	Ditto	1)279 6)623 7)8-378
Clarsen reaction (Ethyl acetate, sodium, sulfuric acid)	107	**Water:** organic & inorganic sodium salts, ethyl acetate, ethyl acetoccetate	—	—	Organic synthesis, antipyrine; lacquers; dopes; plastics; manufacture of dyes, pharmaceuticals, antimalarials, vitamin B; flavoring	1)288 2)35 3)649
Esterification (Acrylic acid, ethanol, sulfuric acid or Dowex 50 ion exchange resin or silica gel catalyst)	122	**Water: kg/Mg** polymers (11.9), hydroquinone (13.75) **Air: kg/Mg** ethanol (2.65), ethylacrylate (1.6), ethyl-acetate (5.25), sodium carbonate (0.26)	—	125.1/1973 139.6/1974	Manufacturing: about 34% emulsion polymers (about half used in surface coatings), about 10% used in other polymers (especially solvent coatings & fibers); organic synthesis; miscellaneous	1)321 2)44 3)649 6)604 11)37 13)36

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
191 (Continued)				LCLo:1000 ppm/4H, ihl-rat LCLo:1204 ppm/7H, ihl-rbt and gpg LD50:1950 mg/kg, skn-rbt		
192 DP	Ethylamine (Ethanamine) $C_2H_5NH_2$ (C_2H_7N)	000075047 (Z2)	400 rat	High toxicity via skn, orl, eye, & mucous membrane routes LCLo:3000 ppm/4H, ihl-rat LD50:390 mg/kg, skn-rbt	USOS air: TWA 10 ppm or 18 mg/m^3	—
193	Ethylbenzene (Benzene, ethyl) $C_6H_5C_2H_5$, (C_8H_{10})	000100414 (2R)	3500 rat	TCLo:100 ppm/4H, ihl-hmn Irr to skn & muc men; in gpg, exposure causes ataxia, unconsciousness, tremor & death through respiratory failure; effects of chronic exposure are unknown LDLo:4000 ppm/4H, ihl-rat LCLo:10,000 ppm, ihl-gpg	USOS air: TWA 100 ppm or 435 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
194	Ethyl bromide (Ethane, bromo-) CH_3CH_2Br (C_2H_5Br)	000074964 (E2)	—	Anesthetic & narcotic; liver & kidney damage in hmn LCLo:3200 ppm, ihl-gpg LCLo:149000/15M, ihl-rat	USOS air: TWA 200 ppm or 890 mg/m^3	—
195	Ethylcellulose (Cellulose, ethyl ether) $(C_6H_{10}O_5)_xC_2H_5$ $(C_8H_{15}O_5)$	009004573	—	Unknown	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See Diethylamine	120	**Emission factors:** ethyl chloride - 1.0, NH_3 - 1.0	—	25.2/1972	Dye intermediate, solvent extraction; petroleum refining; stabilizer for rubber latex; detergents; organic synthesis; plasticizers; deflocculants; textile finishes	1)316 2)385 3)650 4)431 5)561 7)2-122 12)
Alkylation, liquid phase or vapor phase (Benzene, ethylene, aluminum chloride or various solid catalysts)	1	**Liquid Phase Process** **Water: kg/Mg** benzene (11), HCl (3.9), aluminum salts (trace), tars (26.6) **Vapor Phase Process** **Water:** Flow (3.15 m^3/kg) COD (5,980 mg/l) (1.88 g/kg) BOD_5 (433 mg/l) (0.136 g/kg) TOC (2,091 mg/l) (0.66 g/kg)	— Heavy aromatics disposed of by incineration	2580/1973 2750/1974 2145/1975 3809/1978	95.5% intermediate in production of styrene; 2% solvent; export	1)45 2)161 3)651 5)561 11)36
See Xylenes	359	—	—	—	—	1)826
Hydrobromination, Bromination (Ethylene, hydrogen bromide, gamma irradiation catalyst. Also ethanol and HBr)	83	—	—	—	Organic synthesis; medicine (anesthetic); refrigerant; solvent; grain & fruit fumigant	1)234 2)387 3)651 5)561
Alkylation (Cellulose, 50% NaOH soln, ethyl chloride, HCl, benzene or toluene)	118	**Air:** ethyl chloride, ethanol, ethyl ether, benzene or toluene **Water:** NaOH, ethyl cellulose, NaCl, degraded cellulose, all of above under air	—	2.9/1973	Protective surface coatings; hot-melt adhesives & coatings for cables, paper, textiles, etc.; extrusion wire insulation; pigment-grinding base; toughening agent for	1)309 3)653 7)4-641

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
195 (Continued)						
196 DP	Ethyl chloride (Ethane, chloro-) CH_3CH_2Cl C_2H_5Cl	000075003 (G2)	—	TCLo:13,000 ppm, TFX:CNS, ihl-hmn Irr to eyes; causes unconsciousness; least toxic of all chlorinated hydrocarbons LCLo:4000 ppm/ 45M, ihl-gpg	USOS air: TWA 1,000 ppm or 2,600 mg/m^3	—
197	Ethyl chloroacetate (Acetic acid, chloro-, ethyl ester) $CH_2ClCOOC_2H_5$ $(C_4H_7ClO_2)$	000105395 (G1VO1)	—	Moderate irr via orl and ihl	—	—
198 DP	Ethyl cyanoacetate (Acetic acid, cyano-, ethyl ester) $CNCH_2CO_2C_2H_5$ $(C_5H_7NO_2)$	000105566 (NC1VO2)	—	Highly toxic LC50:750 mg/kg, ipr-mus LDLo:1500 mg/kg, scu-rbt	—	—
199	Ethylene CH_2CH_2 (C_2H_4)	000074851 (1U1)	—	Anesthesia; simple asphyxiant; phytotoxic LC50:95 pph ihl-mus	Lethal conc in air for mice, 950,000 ppm	—
200	Ethylene carbonate (Carbonic acid, cyclic ethylene ester) OCH_2CH_2OCO $(C_3H_4O_3)$	000096491 (T5OVOTJ)	10,000 rat	Unknown LDLo:500 mg/kg ipr-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					plastics; printing inks; molding powders; proximity fuses; vitamin preparation; casing for rocket propellants; food & feed additive	
Hydrochlorination, Chlorination (Ethylene, hydrogen chloride, aluminum chloride catalyst)	115	**Water & air:** ethylene, HCl, ethyl chloride, CH_4, $AlCl_3$ **Emission factors:** ethylene dichloride - 12.0, ethyl chloride - 5.0, methane - 5.0, ethane - 5.0, ethylene - 5.0	—	300/1973 246/1978	80% manufacture tetraethyl lead; ethylcellulose; anesthetic; organic synthesis, alkylating agent; refrigeration; analytical reagent; solvent for phosphorus, sulfur, fats, oils, resins & waxes; insecticides; aerosols	1)303 2)387 3)654 7)5-146 9)205 12) 13)36
Esterification (Chloroacetic acid, ethanol, sulfuric acid catalyst)	110	**Water:** sulfuric acid, ethyl chloroacetate, chloroacetic acid, ethanol	—	—	Solvent; organic synthesis; military poison gas; vat dyestuffs	1)294 2)17 3)731
Substitution (Ethyl chloroacetate, sodium cyanide, ethyl alcohol, sulfuric acid)	113	**Air:** HCN **Water:** Salts, dilute acids, traces ethanol and ethyl syanoacetate	—	—	Organic synthesis, pharmaceuticals; dyes	1)299 2)19 3)655
—	—	—	—	10,859/1974 12,786/1978	Manufacturing: 40% polyethylene, 20% ethylene oxide, 14% ethylene dichloride & deriv., 8% ethyl benzene, 6% ethanol, 12% misc. including: ethylene glycols, aluminum alkyls, ethyl chloride, ethylene chlorohydrin, acetaldehyde, linear alcohols, trichloroethylene, etc.	2)418 3)657 4)434 6)626A 7)C-519 13)36
Condensation, Addition (Ethylene oxide, CO_2, catalyst)	156	**Water:** Traces of reactants and products plus CO	—	—	Solvent for many polymers & resins; solvent extraction; synthesis of pharmaceuticals; rubber chemical, textile finishing agents	1)394 2)283 3)657

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
201	Ethylene chlorohydrin (Ethanol, 2-chloro-) CH_2ClCH_2OH (C_2H_5ClO)	000107073 (Q2G)	LDLo:50 hmn 4)434 58 rat 2)402 81 mus 110 gpg	LCLo:300 ppm/2H, ihl-hmn LDLo:5000 mg/kg, TFX:SKN, skn-hmn Highly toxic LCLo:32 ppm/4H, ihl-rat LDLo:72 mg/kg, ipr-rat LD50:84 mg/kg, skn-rat LD50:385 mg/m^3, ihl-mus	USOS air: TWA 5 ppm (skn) or 16 mg/m^3	—
202	Ethylene diamine (1,2-ethanediamine) $NH_2CH_2CH_2NH_2$ (C_2H_8N)	000107153 (Z2Z)	1160 rat 4)434 760 rat 470 gpg	TCLo:200 ppm, TFX:IRR, ihl-hmn Air dermatitis asthma LC50:4000 ppm/8H, ihl-rat LD50:424 mg/kg, scu-mus LD50:730 mg/kg, skn-rbt	USOS air: TWA 10 ppm or 25 mg/m^3	—
203 DP	Ethylene dibromide (Ethane, 1,2-dibromo) CH_2BrCH_2Br $C_2H_4Br_2$	000106934 (E2E)	140 rat 55 rbt 110 gpg 79 ckn LDLo:250 mus	LDLo:50 mg/kg, orl-hmn LDLo:80 mg/kg, orl-hmn High toxicity via skn, orl or ihl LCLo:400 ppm/2H, ihl-rat LD50:300 mg/kg, skn-rbt LCLo:400 ppm/3H, ihl-gpg	USOS air: TWA 20 ppm or 145 mg/m^3 CL 30 ppm PK 50 ppm/5M/8H	TDLo:400 mg/kg/10WI TFX:CAR, orl-rat TDLo:18 gm/kg/42WI TFX:CAR, orl-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Addition (Ethylene, chlorine, aqueous sodium hydroxide)	136	**Water:** hypochlorous acid, chlorine, NaOH, HCl, NaCl, ethylene chlorohydrin, possibly ethylene dichloride and dichloroethyl ether (known carcinogen)	—	—	Solvent for cellulose acetate, ethylcellulose; introduction of hydroethyl group in organic synthesis; to activate sprouting of dormant potatoes; manufacture of ethylene oxide & ethylene glycol; dyes	1)357 2)402 3)657 4)434 5)561 7)5-309
Amination, Ammonolysis (Ethylene dichloride, ammonia, sodium hydroxide)	134	**Air:** ammonia, ethylenediamine, higher amines, ethylene dichloride **Water:** sodium hydroxide, ammonium chloride **Emission factors:** ethylene dichloride - 1.0, hydrocarbons - 1.0, NH_3 - 1.0	—	30/1974	Manufacturing: 25% carbamate fungicides, 13% chelating agent (EDTA), 8% dimethlolethylene urea resins, 8% aminoethylethanolamine, 25% exports, 21% misc.; solvent for albumin & fibrin; medicine; neutralizing oils; stabilizing rubber latex; corrosion inhibitor in antifreeze solutions; textile lubricants; dyes; rubber accelerators; making ethylenediamine nitrate, chlorate; dehairing skins; polyamide resin adhesives	1)353 2)387 3)658 4)434 5)561 10) 12) 13)36
Bromination (Ethylene, bromine)	114	**Emission factors:** ethylene bromide - 10.0, ethylene - 5.0, Br_2 - 1.0	—	150.3/1973	Almost 100% used as scavenger for lead in gasoline; grain & fruit fumigant; general solvent; waterproofing preparations; organic synthesis; insecticides; medicine	1)301 2)388 3)658 5)563 6)627 9)205 12) 13)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
204	Ethylene dichloride (Ethane, 1,2-dichloro) EDC CH_2ClCH_2Cl $C_2H_4Cl_2$	000107062 (G2G)	680 rat 2)388 770 rat 3)658	LDLo:500 mg/kg, orl-hmn LDLo:810 mg/kg, orl-man TDLo:428 mg/kg, TFX:GIT, orl-hmn TCLo:4000 ppm/H, TFX:CNS, ihl-hmn Irr to eyes & upper respiratory tract. Narcotic. Fatty degeneration of liver & kidneys in aminal experiments. Dermatitis & edema in the lungs. Experimental mutagen & teratogen 3)658 LCLo:1000 ppm/4H, ihl-rat LDLo:600 mg/kg, ipr-rat LDLo:500 mg/kg, scu-rat	USOS air: TWA 50 ppm or 200 mg/m^3 CL 100 ppm PK 200 ppm/5M/8H	Experimental carcinogen 3)658
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxychlorination (Ethylene, HCl, O_2, $CuCl_2$ catalyst)	132	**Air:** 43 Gg/yr hydrocarbon emission for oxychlorination process. Specific compounds in kg/hr: CO_2 (957), CO (264), CH_4 (78), ethylene (191), ethane (260), ethylene dichloride (272), ethyl chloride (231), aromatic solvent (43) **Water:** Total 0.1908 Gg/Gg EDC. Scrubber effluent 142 Mg/hr **Solids:** 181 Mg/yr	**Water:** Direct fired boiler plus scrubber control system thermal incinerator and scrubber system	4210/1973 3496/1974 2700/1975 4755/1978	Synthesis: 81% vinyl chloride, 3% methylchloroform, 3% trichloroethylene, 3% ethyleneimines, 3% perchloroethylene; 2% vinylidene chloride; 3% coupling agent in antiknock gasoline; paint varnish & finish remover; metal degreasing; soaps & scouring compounds	1)343 2)388 3)658 5)563 6)627 7)5-153 9)205 10) 11)33
Chlorination (Ethylene, chlorine, $FeCl_3$ catalyst)	131	**Air:** 13.1 Gg/yr hydrocarbon emission for chlorination process. Specific compounds kg/Mg: ethane (3.0), ethylene (7.5), CH_4 (3.0), Cl_2 (0.5), HCl (0.5) **Water: kg/Mg** Cl_2 (0.874), ethylene dichloride (3.25), HCl (3.8), vinyl chloride (0.6), 1,1,2-trichloroethane (2.45), tetrachloroethane (2.45), methyl chloride (0.05), ethyl chloride (0.05), NaOH (0.6), NaCl (0.2), tars (trace)	**Water:** HCl scrubber and solids fitter	Ditto	Ditto	1)339
"Balanced Process" (Ethylene, Cl_2, HCl, O_2)	131 & 132	See 131 and 132	Ditto	Ditto	Ditto	1)343 1)339

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
205 DP	Ethylene glycol CH_2OHCH_2OH $(C_2H_6O_2)$	000107211 (Q2Q)	5840 rat-cat 6610 gpg 2000 cat	LDLo:1500 mg/kg, orl-hmn Lethal dose for man is 100 ml. CNS stimulation followed by depression. Kidney damage causes death. Very toxic in particulate form. LD50:3000 mg/kg, ivn-mus LDLo:2700 mg/kg, scu-mus LDLo:1000 mg/kg, ipr-rbt	100 ppm; 260 mg/m^3	TDLo:4 gm/kg TFX:NEO, skn-mus 3)659
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
206	Ethylene glycol diacetate $(CH_2OOCCH_3)_2$ $(C_6H_{10}O_4)$	000111557 (1V020V1)	6850 rat 4940 gpg	LDLo:500 mg/kg, orl-hmn LD50:1070 mg/kg, ipr-mus LD50:8480 mg/kg, skn-rbt	—	—
207	Ethylene glycol dibutyl ether (Ethane, 1,2-dibutoxy) Dibutyl Cellosolve $(C_4H_9)_2OCH_2CH_2O$ $(C_{10}H_{22}O_2)$	000112481 (40204)	3250 rat	—	—	—
208	Ethylene glycol diethyl ether (Ethane, 1,2-diethoxy-) Diethyl Cellosolve	000629141 (201V102)	4390 rat 2440 gpg	LCLo:8000 ppm/4H ihl-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Condensation & Reduction, Carbonylation & reduction (Formaldehyde, CO, BF_3 catalyst, then H_2 and CuO/MgO catalyst)	203	**Water:** formaldehyde, methanol, alcohols, acids	––	1489/1973 1518/1974 1727/1975 1827/1978	50% coolant & antifreeze; manufacturing; 35% polyester fiber, 4% alkyd & polyester resins, 1% emulsion paints; asphalt-emulsion paints; heat-transfer agent in refrigeration & electron tubes; low-pressure laminates; brake fluids; glycol diacetate; low-freezing dynamite; solvent; extractant for various purposes; solvent mixtures for cellulose esters & ethers, especially cellophane; cosmetics (up to 5%); lacquers; printing inks; wood stains; adhesives; leather dyeing; textile processing; tobacco; ingredient of deicing fluid for airport runways	1)504 2)421 3)659 6)627 8)164 9)203 11)36
See diethylene glycol	144	––	––	Ditto	Ditto	1)374
Esterification (Ethylene glycol, acetic acid)	145	**Air & Water:** ethylene glycol, acetic acid, ethylene glycol, mono- & diacetate	––	2.8/1973	Solvent for cellulose esters & ethers; resins; lacquers; printing inks; perfume fixative; nondiscoloring plasticizer for ethyl & benzyl cellulose	1)377 2)431 3)660 9)203
See diethylene glycol monobutyl ether acetate	150	––	––	––	High-boiling inert solvent; specialized solvent & extraction applications	1)384 2)388
Ditto	150	––	––	––	Organic synthesis (reaction medium); solvent & diluent for detergents	1)384 2)389

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
209	Ethylene glycol dimethyl ether (Ethane, 1,2-dimethoxy) $(CH_3OCH_2)_2$ $(C_4H_{10}O_2)$	— (10201)	—	Unknown	—	—
210	Ethylene glycol monoacetate $CH_3COOCH_2CH_2OH$ $(C_4H_8O_3)$	000542596 (Q20V1)	3800 gpg	Low toxicity in animal experiments LD50:1310 mg/kg, ipr-mus	—	—
211	Ethylene glycol monobutyl ether (Ethanol, 2-butoxy-) (Butyl Cellosolve) $C_4H_9OCH_2CH_2OH$ $(C_6H_{14}O_2)$	000111762 (Q204)	1480 rat 1230 mus 320 rbt 1200 gpg	LDLo:50 mg/kg, orl-hmn TDLo:195 ppm/8H, TFX:IRR, ihl-hmn LCLo:500 ppm/4H, ihl-rat LD50:550 mg/kg, ipr-rat LD50:340 mg/kg, ivn-rat LC50:700 ppm/7H, ihl-mus LD50:536 mg/kg, ipr-mus LD50:1130 mg/kg, ivn-mus LD50:280 mg/kg, ivn-rbt LD50:230 mg/kg, skn-gpg	USOS air: TWA 50 ppm (skn) or 240 mg/m^3	—
212	Ethylene glycol monobutyl ether acetate (Ethanol, 2-butoxy-, acetate) (Butyl Cellosolve Acetate)	000112072 (4020V1)	3200 mus LDLo:1600 rat	LD50:1580 mg/kg, skn-rat	—	—
213	Ethylene glycol monoethyl ether (Ethanol, 2-ethoxy) (Cellosolve) $C_2H_5OCH_2CH_2OH$ $(C_4H_{10}O_2)$	000110805 (Q202)	3000 rat 4300 mus 3100 rbt 1400 gpg	LDLo:500 mg/kg, orl-hmn Saturated (0.6%) vapor in air for 18-24 hours may produce congestion & edema of lungs & congestion of kidneys in animals. Irr to eyes in hmn.	USOS air: TWA 200 ppm (skn)	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See diethylene glycol monobutyl ether acetate	150	—	—	—	Solvent	1)384 3)660
See ethylene glycol diacetate	145	—	—	—	Solvent for nitrocellulose, cellulose acetate, camphor	1)377 2)421 3)660
See diethylene glycol monobutyl ether	149	**Emission factors:** ethylene oxide - 1.0, butanol - 0.5	—	62.4/1973	Solvent for nitrocellulose resins; spray lacquers; varnishes; enamels; dry-cleaning compounds; varnish removers; textile (preventing spotting in printing or dyeing); mutual solvent for "soluble" mineral oils to hold soap in solution & to improve the emulsifying properties; synthetic 2-butoxyethyl acetate, di(2-butoxyethyl)phthalate	1)381 2)401 3)659 5)560 9)204 12) 13)37
See diethylene glycol monobutyl ether acetate	151	—	—	—	High-boiling solvent for nitrocellulose lacquer, epoxy resins, multicolor lacquers; film coalescing aid for polyvinyl acetate latex	1)385 2)401 3)439
See diethylene glycol monobutyl ether	149	**Emission factors:** ethylene oxide - 1.0	—	72.2/1974 86.5/1973	Synthesis: 2-ethoxyethyl acetate solvent; nitrocellulose, natural & synthetic resins; mutual solvent for formulation of soluble oils; lacquers & lacquer thinners; dyeing & printing textiles; varnish removers; cleaning solutions; leather;	1)381 2)405 3)475 6)636 9)204 10) 12)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
213 (Continued)				Absorbed by skn LCLo:4000 ppm/4H, ihl-rat LCLo:1820 ppm, ihl-mus LD50:1710 mg/kg, ipr-mus		
214	Ethylene glycol monoethyl ether acetate (Ethanol, 2-ethoxy-, acetate) (Cellosolve Acetate) $CH_3COOCH_2CH_2OCH_2CH_3$ ($C_6H_{12}O_3$)	000111159 (2020V1)	5100 rat 1910 gpg	Absorbed by skn LCLo:1500 ppm/4H, ihl-rat LD50:1420 mg/kg, ipr-mus	USOS air: TWA 100 ppm (skn) or 540 mg/m^3	—
215	Ethylene glycol monohexyl ether (Ethanol, 2(hexyloxy)) (Hexyl Cellosolve) $C_6H_{13}OCH_2CH_2OH$ ($C_8H_{18}O_2$)	000112254 (Q206)	1480 rat	LD50:890 mg/kg, skn-rbt	—	—
216	Ethylene glycol monomethyl ether (Ethanol, 2-methoxy) (Methyl Cellosolve) $CH_3OCH_2CH_2OH$ ($C_3H_8O_2$)	000109864 (Q201)	2460 rat 890 rbt 950 gpg	LDLo:3570 mg/kg, orl-hmn TCLo:25 ppm, TFX:CNS, ihl-hmn Abnormalities in blood, exaggerated reflexes, tremors LDLo:2000 ppm/4H, ihl-rat LD50:2140 mg/kg, ivn-rat LC50:1340 mg/kg, ihl-rbt LD50:1340 mg/kg, skn-rbt	USOS air: TWA 25 ppm (skn) or 80 mg/m^3	—
217	Ethylene glycol monomethyl ether acetate (Ethanol, 2-methoxy-acetate) (Methyl Cellosolve Acetate) $CH_3OCH_2CH_2OOCCH_3$ ($C_5H_{10}O_3$)	000110496 (1V0201)	3390 rat 1250 gpg	LDLo:500 mg/kg, orl-hmn TCLo:1000 mg/m^3 TFX:IRR, ihl-hmn LCLo:7000 ppm/4H, ihl-rat	USOS air: TWA 25 ppm (skn) or 120 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					anti-icing additive for aviation fuels	
Ditto	151	**Emission factors:** ethoxyethanol - 1.0	--	--	Solvent for nitrocellulose; oils & resins; retards "blushing" in lacquers, varnish removers; wood stains; textiles; leather	1)385 2)405 3)475 5)561 12)
See Diethylene glycol monobutyl ether	149	--	--	--	High-boiling solvent	1)381 2)406 3)724
Ditto	Ditto	**Emission factors:** 2-methoxyethanol - 1.0, ethylene - 1.0	--	39.1/1973	51% jet fuel deicing additive; 10% solvent for nitrocellulose, cellulose acetate, natural & synthetic resins, alcohol-soluble dyes, varnishes; leather; perfume fixative; wood stains; sealing moisture-proof cellophane	1)381 2)407 3)661 5)561 6)636 9)204 12) 13)37
--	151	--	--	--	Solvent for nitrocellulose, cellulose acetate, various gums, resins, waxes, oils; textile printing; photo film; lacquers; dopes	1)385 2)407 3)813 5)561

(Continued)

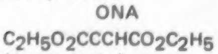
TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
218	Ethylene glycol monooctyl ether (Ethanol, 2-octyloxy-) $C_4H_9CHC_2H_2CH_2OCH_2CH_2OH$ ($C_{10}H_{22}O_2$)	010020436 (Q208)	—	Unknown	—	—
219	Ethylene glycol monophenyl ether (Ethanol, 2-phenoxy-) (Phenyl Cellosolve) $C_6H_5OCH_2CH_2OH$ ($C_8H_{10}O_2$)	000122996 (Q20R)	1260 rat	LDLo:50 mg/kg, orl-hmn LD50:5000 mg/kg, skn-rbt	—	—
220	Ethylene glycol monopropyl ether (Ethanol, 2-propoxy) (Propyl Cellosolve) $C_3H_7OCH_2CH_2OH$ ($C_5H_{12}O_2$)	002807309 (Q203)	4890 rat	LCLo:2000 ppm/4H, ihl-rat LC50:1530 ppm, ihl-mus LD50:940 mg/kg, skn-rbt	—	—
221 DP	Ethylene oxide $(CH_2)_2O$ C_2H_4O	000075218 (T30TJ)	330 rat 270 gpg	Irr to eyes & muc mem of respiratory tract; high conc can cause pulmonary edema TCLo:1000 ppm/4H TFX:MUT TDLo:30 mg/m^3 TFX:MUT, ihl-man LC50:1462 ppm/4H, ihl-rat LC50:836 ppm/4H, ihl-mus LC50:960 ppm/4H, ihl-dog LCLo:7000 ppm/150M, ihl-gpg	—	—
222	Ethyl ether (Ethane, 1,1′-oxybis) $C_2H_5OC_2H_5$ ($C_4H_{10}O$)	000060297 (202)	1700 rat	LDLo:420 mg/kg, orl-hmn TCLo:200 ppm TFX:IRR, ihl-hmn CNS depressant; death results from severe & continued exposure LDLo:2000 mg/kg, ipr-gpg LCLo:76,000 ppm, ihl-dog	USOS air: TWA 400 ppm or 1200 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See diethylene glycol monobutyl ether	149	—	—	—	Solvent for cellulose esters; plasticizer	1)381 3)661
Ditto	Ditto	—	—	—	Solvent for cellulose acetate, dyes, inks, resins; perfume & soap fixative; bacterial agent; organic synthesis of plasticizers, germicides, perfume materials & pharmaceuticals	1)381 2)408 3)900
Ditto	Ditto	—	—	—	—	1)381 2)409
Oxidation (Ethylene, oxygen, air)	143	Air: ethylene, ethylene oxide Water: flow from 2 plants given in 1)	Gas scrubber, stripper	1890/1973 1765/1974 2195/1978	Synthesis: ethylene glycol 27% antifreeze; 23% polyester fiber & film; 13% surfactants; 10% misc.; 9% ethanolamines; petroleum demulsifier; fumigant; rocket propellant; sterilizers; insecticides	1)370 2)422 3)662 6)628 7)8-552 11)37
See ethanol process no. 119 (Ethylene, water, phosphoric acid catalyst)	119	Emission factors: ethanol - 3.0, ethylene - 3.5	—	32.8/1973 27.2/1974	65% industrial solvent (smokeless powder); 25% synthesis; 3% anesthetic; perfumery; extractant; alcohol denaturant	1)312 2)390 3)663 5)561 6)630 7)8-486 9)205 10) 12) 13)38

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	— —	—	—	—	—	—
223	2-Ethylhexanol (1-Hexanol,-2-ethyl) $C_4H_9CH(C_2H_5)CH_2OH$ $(C_8H_{18}O)$	000104767 (Q1Y4&2)	3200 rat LDLo:3200 mus	LD50:2380 mg/kg, skn-rbt	—	—
224 DP	Ethylorthoformate (Orthoformic acid, triethyl ester) $HC(OC_2H_5)_3$ $(C_7H_{16}O_3)$	000122510 (2O 3Y)	2920 rat	Irr to skn & muc mem. Narcotic in high concn. LCLo:8000 ppm/4H, ihl-rat	—	—
225 DP	Ethyl oxalate (Oxalic acid, diethyl ester) $(COOC_2H_5)_2$ $(C_6H_{10}O_4)$	000095921 (2OVVO2)	400 rat	Orl toxicity high	—	—
226 DP	Ethyl sodium oxalacetate (Oxalacetic acid, diethyl ester)  $C_2H_5O_2C\overset{O}{C}\overset{NA}{C}HCO_2C_2H_5$ $(C_8H_{11}NaO_5)$	026103775 (2OVV1VO & -NA-)	—	—	—	—
227 DP	Formaldehyde (HCHO)	000050000 (VHH)	800 rat 260 gpg	LDLo:36 mg/kg, orl-wmn LDLo:500 mg/kg, or-hmn TCLo:17 mg/m^3/30M, TFX:IRR, ihl-hmn Irr; violent vomiting & diarrhea leading to collapse	USOS air: TWA 3 ppm; CL 5 ppm; PK10 ppm/30M/8H	TDLo:1300 mg/kg/65WI, TFX: NEO, scu-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
(Ethanol, sulfuric acid)	127	––	––	Ditto	Ditto	1)332
Condensation & hydrogenation (n-Butyraldehyde, hydrogen, Ni, catalyst)	90	**Air:** butyraldehyde (58.5 kg/mg) light hydrocarbons (113.5 kg/Mg) 2-ethylhexanol **Emission factors:** hydrocarbons - 227.0, butyraldehyde - 117.0	Heavy ends usually burned	183/1973 224/1977 189/1978	Manufacturing: 80% plastizer, mostly for PVC resins, 10% 2-ethyl hexylacrylate defoaming agent; wetting agent; organic synthesis; solvent mixtures for nitrocellulose, paints, lacquers, baking finishes; penetrant for mercerizing cotton; textile finishing compounds; plasticizers; inks; rubber; paper; lubricants; photo; dry cleaning	1)249 2)458 9)203 12) 13)38
Substitution, Addition (Hydrogen cyanide, ethanol, hydrochloric acid)	167	**Air or water:** chlorine, chlorohydrocarbons	––	––	Intermediate; general purpose food additive	1)427 2)605 3)1052
Esterification (Oxalic acid, ethanol)	121	**Water:** solvent, ethanol, oxalic acid, ethyl oxalate **Air:** ethanol & solvent	––	––	Solvent for cellulose & ethers, many natural & synthetic resins; radio tube cathode fixing lacquers; dye intermediate; pharmaceuticals; perfume preparation; organic synthesis	1)319 2)609 3)671
Claisen reaction (Ethylacetate, ethyl oxalate, sodium alcoholate)	129	––	––	––	Dyes, synthesis	1)335
Oxidation (Methanol, air, silver catalyst)	202	**Air:** CO (63.5 g/kg 37% formaldehyde), H_2 (7.6 g/kg), CH_4 (1.25 g/kg), HCHO (trace), CH_3OH trace) **Water:** dimethyl ether	––	(37 wt percent) 2918/1973 2654/1974 2923)1978	Manufacturing: 30% urea & melamine resins, 24% phenolic resins, 9% acetal resins, 6% pentaerythritol, 6% hexamethylenetetramine, 4% melamine-resins, 3% tetrahydrofuran, 3% acetylenic chemicals, 2% -4,4'-methylenedianiline,	1)500 2)428 3)694 6)632 11)36 13)38

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
227 (Continued DP				LCLo:250 ppm/4H, ihl-rat LD50:420 mg/kg, scu-rat LCLo:900 mg/m^3/2H, ihl-mus LDLo:16 mg/kg, ipr-mus LD50:300 mg/kg, scu-mus LDLo:550 mg/kg, scu-dog LCLo:820 mg/m^3/8H, ihl-cat LDLo:240 mg/kg, scu-rbt		
228 DP	Formamide HCONH (CH_3NO)	000075127 (ZVH)	7500 rat	TDLo:6 gm/kg (7-120 preg) TFX:TER, orl-rat TDLo:6 gm/kg/(11-16D preg), TFX:TER, ipr-rat	USOS air: TWA 20 ppm	—
229 DP	Formic acid HCOOH (CH_2O_2)	000064186 (VHQ)	1210 rat 1100 mus 4000 dog	Irr to skn, eye, & macous membranes LD50:940 mg/kg, ipr-mus LD50:145 mg/kg, ivn-mus LDLo:239 mg/kg, ivn-rbt	USOS air: TWA 5 ppm or 9 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					2% trimethylolpropane, 1% acrylic esters, misc., including 3% chelating agents & 2% textile applications; dyes; medicine (disinfectant, fungicide, germicide); embalming fluids; preservative; hardening agent	
Ammonolysis (Methyl or ethyl formate, ammonia)	199	**Air:** methanol or ethanol	---	---	Solvent, softener, interest in organic synthesis; printing ink; sodium silicate silicate gelation	1)495 2)428 3)694 7)10-105
See butyric acid	227	**Emission factors:** CO - 15.0, formic acid - 1.0	---	24.2/1973	Dyeing & finishing of textiles & paper, leather treatment; chemicals (formates, oxalic acid, organic esters); manufacturing of fumigants, insecticides refrigerants; solvent for perfumes, lacquers; electroplating; medicine; brewing (antiseptic); silvering glass; cellulose format; natural latex coagulant; ore flotation; vinyl resin plasticizers; animal fee additive; packaging	1)560 2)430 3)695 5)561 7)10-102 9)201 12)
Condensation	94	**Air:** acetaldehyde, formaldehyde, methanol, ethanol **Water:** sodium formate, inorganic sodium salts	---	---	Ditto	1)257

(Continued)

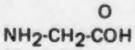
TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
230	Fumaric acid HOOCCHCHCOOH ($C_4H_4O_4$)	000110178 (QV1U1VQ-T)	LDLo:5000 rbt	LD50:200 mg/kg, ipr-mus	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
231	Glyceraldehyde $CHOCHOHCH_2OH$ ($C_3H_6O_3$)	000367475 (VHYQ1Q)	LDLo:5000 rat	—	—	—
232 DP	Glycerine (Glycerol $CH_2OHCHOHCH_2OH$ ($C_3H_8O_3$)	000056815 (Q1YQ1Q)	470 mus 12600 rat 7150 gpg	Ihl irr LD50:4250 mg/kg, ivn-mus LD50:10,000 mg/kg, scu-mus	10 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (Benzene, air, $V_2O_5 + P_2O_5$ catalyst)	24	**Air or Water:** benzene **Emission factors:** benzene - 15.0, malic acid - 4.0, fumeric acid - 4.0, NH_3 - 3.0	––	24.3/1973 19.1/1974	34% food acidulants, 26% synthetic resins (unsaturated polyesters), 14% paper-size resins, 10% surface coatings (alkyd resins), 4% plasticizers; resin esters & adducts; upgrading natural drying oils (especially tall oil) to improve drying characteristics; mordant; organic synthesis	1)95 2)432 3)697 9)202 10) 12) 13)38
Isomerization (Maleic acid, base, acid, or salt catalyst)	43	**Air:** unreacted hydrocarbons	––	Ditto	Ditto	1)135
Epoxidation and hydration, Hydroxylation (Acrolein, hydrogen peroxide)	254	**Water:** acrolein, glycidaldehyde, glyceraldehyde	––	––	Biochemical research; intermediates; nutrition; preparation of polyesters, adhesives; cellulose modifier; leather tanning	1)622 2)442
Epoxidation and hydration (Allylalcohol, hydrogen peroxide, sodium hydroxide, tungstic acid)	252	**Air: kg/Mg** Allyl alcohol (6), butanol (2), acrolein (20), light impurities (22) **Water: kg/Mg** allyl alcohol (4), glycerin (3.5), light impurities (23.5)	––	94.4/1973 (Synethetic only) 161.8/1974	23% drug & cosmetics, 21% manufacture alkyd resins, 15% tobacco, 12% foods & beverages, 11% cellophane, 10% polyester polyols, 5% explosives, misc.; solvent; printer's ink rolls; polyurethane polyols; emulsifying agent; inks; binder for cements & mixes; paper coatings & finishes; special soaps; lubricant & softener; bacteriostat; hydraulic fluid	1)618 3)442 6)633 9)203 10) 13)39
Hydrogenation (Glyceraldehyde, hydrogen, Ni catalyst)	255	**Air:** glyceraldehyde, glycerol	––	––	Ditto	1)624
Epoxidation and hydrolysis, peroxidation and hydrolysis (Allyl alcohol, peracetic acid)	292	**Air:** Allyl alcohol, t-butyl alcohol **Water:** allyl alcohol, glycidol sodium carbonate, t-butyl alcohol or methyl phenyl carbinol	––	––	Ditto	1)693

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
232 (Continued)						
	Ditto	Ditto	Ditto	Ditto	Ditto	––
	Ditto	Ditto	Ditto	Ditto	Ditto	––
233	Glycerol tri-(polyoxypropylene) ether $(CHO)_3$ $(C_3H_3O_3)$	––	––	––	––	––
234 DP	Glycine $NH_2\text{-}CH_2\text{-}\overset{O}{C}OH$ $(C_2H_5NO_2)$	000056406 (Z1VQ)	––	Unknown LDLo:3000 mg/kg, ivn-cat	––	––
235	Glyoxal OCHCHO $(C_2H_2O_2)$	000107222 (VHVH)	760 gpg 1105 rat	LD50:200 mg/kg, ipr-mus LDLo:100 mg/kg, ipr-rat	––	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Hydration and substitution, hydration and dehydrochlorination (Epichlorohydrin, sodium hydroxide, sodium carbonate, toluene, HCl)	319	**Water:** glycerol (& toluene amounts given in 1))	Second effect evaporator Centrifuge Film evaporator Toluene recovery column Light ends column	—	See item above	1)742 4)499 6)633 7)10-627
Addition and substitution, Chlorohydrination and hydrolysis (Allylalcohol, chlorine, sodium hydroxide)	318	—	—	—	Ditto	1)740
Polyether forma- formation (Glycerol, propylene oxide, ethylene oxide)	293	**Air or water:** propylene oxide, glycerol, product, propylene glycol	—	—	Mostly flexible polyurethane foams, also rigid foams, surfactants, lubricants & functional fluids	1)695 13)39
Ammonolysis (Chloroacetic acid, ammonia)	108	**Water:** ammonia, ammonia salts, chloroacetic acid, glycine	—	—	Organic synthesis, medicine; biochemical research; buffering agent; chicken feed additive; reduces bitter taste of saccharin	1)290 2)443 3)707
Oxidation (Acetaldehyde, nitric acid)	91	—	—	—	Manufacture of textile resins for permanent press process; dimensional stabilization of rayon & other fibers; insolubilizing agent for compounds containing polyhydroxyl groups (polyvinyl alcohol, starch, & cellulosic materials); insolubilizing or proteins (casein, gelatin & animal glue); embalming fluids; leather tanning; paper coatings with hydroxylethyl-cellulose; reducing agent in dyeing textiles	1)251 2)445 3)708 4)502

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
236	Guanidine $(N_2N)_2CNH$ (CH_5N_3)	000113008 (ZYZUM)	—	LDLo:22.5 mg/kg, ipr-rat LDLo:266 mg/kg, scu-mus LDLo:10 mg/kg, ipr-cat LDLo:150 mg/kg, scu-rat LDLo:266 mg/kg, scu-mus	—	—
237	Heptene (C_7H_{14})	000592767 (6U1)	—	Simple asphyxiant	—	—
238	Hexachloroethane (Ethane, hexachloro) CCl_3CCl_3 (C_2Cl_6)	000067721 (GXGGXGGG)	—	LDLo:50 mg/kg, orl-hmn LDLo:325 mg/kg, ivn-dog LDLo:4000 mg/kg, scu-rbt	USOS air: TWA 1 ppm (skn) or 10 mg/m^3	—
239	Hexadecyl alcohol (1-Hexadecanol) (Cetyl alcohol) $CH_3(CH_2)_{14}CH_2OH$ $(C_{16}H_{34}O)$	000124298 (Q16)	—	Practically nontoxic LD50:2600 mg/kg, skn-rbt	—	—
240	Hexamethylene glycol (1,6-Hexanediol) $CH_2OH(CH_2)_4CH_2OH$ $(C_6H_{14}O_2)$	000629118 (Q6Q)	3730 rat	Moderate orl toxicity	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ammonolysis (Urea, ammonia, sulfur dioxide)	185	**Air:** ammonia and SO_2 **Water:** Traces of reactants and products **Solid:** Sulfur	—	204/1967	Organic synthesis	1)465 2)446
Addition, Polymerization (C_3 refinery gas (propylene), C_4 refinery gas (butylenes))	62	**Air:** olefins **Emission factors:** hydrocarbons - 2.0	—	—	Organic synthesis, plant growth retardant; lubricant additive; catalyst surfactants	1)178 3)715 12)
Chlorination (Perchloroethylene, chlorine, sodium hydroxide, ferric chloride catalyst)	236	**Water:** NaCl, NaOH, chlorinated hydrocarbons, perchloroethylene, hexachloroethane	—	—	Organic synthesis; retarding agent in fermentation; camphor substitute in nitrocellulose; rubber accelerator; pyrotechnics & smoke devices; solvent; explosives; medicine; high pressure lubricants; moth repellant; pesticides	1)576 2)390 5)461 7)5-168
—	—	—	—	45.7/1973	Perfumery; emulsifier; emollient; foam stabilizer in detergent; face creams; lotions, lipsticks; toilet preparations; chemical intermediates; detergents; pharmaceutical; cosmetics; base for making sulfonated fatty alcohols; to retard evaporation of water, when spread as a film on reservoirs, or sprayed on growing plants	3)532 6)
—	—	—	—	—	Solvent; resin intermediate coupling agent	2)456 3)722

(Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
241	Hexamethylenetetramine (Urotropin) $(CH_2)_6N_4$ $(C_6H_{12}N_4)$	000100970 (T66 B6 ABC 1B I&BN DN FN HNTS)	—	LDLo:500 mg/kg, orl-hmn skn rash LDLo:512 mg/kg, ipr-mus LD50:9200 mg/kg, ivn-rat LD50:200 mg/kg, scu-cat	—	TDLo:144 gm/kg/72WI, TFX:NEO, scu-rat
242	Hexylene glycol (2,4-PEntanediol, 2-methyl) (2,4-amylene glycol) $CH_3COH(CH_3)CH_2CHOHCH_3$ $(C_6H_{14}O_2)$	000107415 (QY1XQ)	4000 rat 2)620 6860 rat 4)531 3860 mus 3200 rbt 2800 gpg	LDLo:500 mg/kg, orl-hmn TCLo:50 ppm/15M TFX:EYE & IRR ihl-hmn Mod orl toxicity LD50:1299 mg/kg, ipr-mus	25 ppm; 125 mg/m^3 proposed 1974	—
243 DP	Hydrogen cyanide (Hydrocyanic acid) HCN (CHN)	000074908 (NCH)	3.7 mus LDLo:4, dog LDLo:2, cat	LCLo:0.57 mg/kg, orl-hmn LCLo:200 mg/m^3/10M, ihl hmn LCLo:120 mg/m^3/1H, ihl-hmn Death through asphyxia LCLo:544 ppm/5M, ihl-rat LC50:169 ppm/30M, ihl-mus LD50:2.99 mg/kg, ipr-mus LDLo:3 mg/kg, scu-mus LD50:1.1 mg/kg, ivn-mus LD50:2.7 mg/kg, ims-mus	USOS air: TWA 10 ppm (skn) or 11 mg/m^3	—
244 DP	Hydroquinone $C_6H_4(OH)_2$ $(C_6H_6O_2)$	000123319 (QR DQ)	370 rat 2)622 320 rat 3)73 & 4)547 400 mus 200 dog 70 cat 300 pgn 500 gpg	LDLo:29 mg/kg, orl-hmn High toxicity orl and ihl. Active allergen and a strong irritant. LD50:170 mg/kg, ipr-rat LDLo:300 mg/kg, scu-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Condensation (Formaldehyde, ammonia)	205	**Air:** formaldehyde, ammonia, methanol **Water:** formaldehyde, ammonia, methanol, hexamethylenetetramine **Emission factors:** methanol - 5.0, NH_3 - 5.0, formaldehyde - 3.0	Centrifuge. If off-gases are incinerated, NO_x will be produced	45.7/1973	52% catalyst in phenol-formaldehyde & resorcinolformaldehyde resins; 40% high explosive-cyclonite; ingred in rubber-to-textile adhesives; protein modifier; organic synthesis; pharmaceuticals; fuel tablets	1)508 2)455 3)721 6)608 9)199 12) 13)39
Hydrogenation (Diacetone alcohol, hydrogen, catalyst)	258	**Air:** diacetone alcohol, H_2, acetone	––	10.9/1973	––	1)629 2)620 3)890 4)531 9)203
Andrussow Process (Methane, ammonia, air, Pt/Rh catalyst)	166	**Air:** possible emissions are ammonia, methane, SO_2, HCN, CO **Water:** ammonium sulfate, sulfuric acid	––	138.1/1973	Manufacturing; mainly acetone cyanohydrin (synthesis methyl methacrylate), also adiponitrile, chelating agents (NTA, EDTA), sodium cyanide, cyanuric chloride, dyes; fumigant for orchards & tree crops; chelates Most HCN (70-90%) produced and used captively	1)425 2)470 3)728 5)561 7)6-583 13)39
(p-Benzoquinone, iron dust, water)	16	Possible sludge, starting materials, phenolic resins **Emission factors:** hydrocarbons - 2.0, quinone - 1.0	––	8.1/1973	Photo developer (except color film); dye intermediate; medicine; antioxidant; inhibitor; stabilizer in paints & varnishes, motor fuels & oils; antioxidant for fats & oils; inhibitor of polymerization	1)77 2)472 3)731 4)547 7)11-469 9)23 12)

Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
244 (Continued)				LD50:115 mg/kg, ivn-rat LDLo:100 mg/kg, ipr-mus LD50:190 mg/kg, scu-mus LD50:125 mg/kg, ipr-rbt		
245	Isoamyl alcohol (1-Butanol, 3-methyl) $(CH_3)_2CHCH_2CH_2OH$ $(C_5H_{12}O)$	000123513 (Q2Y)	1300 rat 7070 rat LDLo:4250 rbt	LDLo:50 mg/kg, orl-hmn TCLo:150 ppm TFX:IRR, ihl-hmn LDLo:813 mg/kg, ipr-rat LD50:3970 mg/kg, skn-rbt	USOS air: TWA 100 ppm or 360 mg/m^3	TDLo:27 gm/kg/I TFX:CAR, orl-rat TDLo:3.8 gm/kg/I TFX:CAR, scu-rat
246	Isoamyl chloride (Butane, 1-chloro-3-methyl-) $(CH_3)_2CHCH_2CH_2Cl$ $(C_5H_{11}Cl)$	000107846 (G2Y)	—	Unknown	--	--
247	Isoamylene (1-Butene, 2-methyl-) $CH_3CH_2C(CH_3)=CH_2$ (C_5H_{10})	000563462 (1Y1U1)	--	Simple asphyxiant	--	--
248 DP	Isobutanol (Isobutyl alcohol) $(CH_3)_2CHCH_2OH$ $(C_4H_{10}O)$	000078831 (Q1Y)	2460 rat LDLo:3750 rbt	LDLo:500 mg/kg, orl-hmn LCLo:8000 ppm/4H, ihl-rat LD50:4240 mg/kg, skn-rbt	USOS air: TWA 100 ppm or 300 mg/m^3	TDLo:29 gm/kg/I TFX:CAR, orl-rat TDLo:9 gm/kg/I TFX:CAR, scu-rat
249	Isobutyl acetate (Acetic acid, isobutyl ester) $C_4H_9))CCH_3$ $(C_6H_{12}O_2)$ – Butyl acetate, see 66	000110190 (1Y10V1)	15,000 rat 4763 rbt	LCLo:8000 ppm/4H, ihl-rat	USOS air: TWA 150 ppm or 700 mg/m^3	--

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See amyl alcohols, 26	244	--	--	--	Photo chemical; organic synthesis; pharmaceutical products; medicine; solvent; determination of fat in milk; microscopy; flavoring	1)592 2)242 3)748 5)561
See amyl chlorides, 28	242	--	--	--	(Mixtures, usually also containing normal amyl chloride); solvent (nitrocellulose, varnishes, lacquer, neoprene); rotogravure inks; soil fumigation; organic compounds	1)588 3)748
Extraction (C_5 hydrocarbons, sulfuric acid, sodium hydroxide, hexane)	246	**Water:** kg/mg sodium hydroxide (3.05), sodium sulfate (14.0), n-hexane (19.0)	Water separation vessel	--	Organic synthesis; dental & surgical anesthetic; high octane fuel manufacturing	1)595 3)811
Hydrogenation (Isobutyraldehyde, hydrogen, Ni or Cu chromite or MoS)	279	See n-butanol Process 282	--	60.2/1973	25% solvent - mostly acetate in paints & lacquers, 25% lube oil additive; 10% intermediate for amino coating resins; substitute for n-butyl alcohol, paint removers; fluorometric determinations	1)669 2)493 3)749 5)561 7)3-828 9)203 13)39
Esterification (Isobutyl alcohol, acetic acid, sulfuric acid)	280	**Water:** isobutyl acetate, isobutyl alcohol, acetic acid, sulfuric acid **Air:** isobutyl acetate, isobutyl alcohol	--	5.3/1972	Solvent for nitrocellulose in thinners, sealants, & topcoat lacquers; perfumery; flavoring agent	1)671 2)28 3)749 5)561

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
250	Isobutyraldehyde (Isobutylaldehyde) $(CH_3)_2CHCHO$ (C_4H_8O)	000078842 (VHY)	2810 rat 2)494 3700 rat 4)582	Anesthetic; irr to eyes & muc mem of the respiratory tract LCLo:8000 ppm/4H, ihl-rat	—	—
251	Isobutyric acid $(CH_3)_2CHCOOH$ $(C_4H_8O_2)$	000079312 (QVY)	280 rat	Toxicity high orl & skn LD50:500 mg/kg, skn-rbt	—	—
252	Isodecanoic acid $(CH_3)_2CHC_6H_{12}CO_2H$ $(C_{10}H_{20}O_2)$	028933597 (QV6Y)	—	Unknown	—	—
253	Isodecanol (Isodecyl alcohol) $(CH_3)_2CHC_7H_{14}OH$ $(C_{10}H_{22}O)$	025339177 (Q7Y)	—	Toxicity moderate orl & skn	—	—
254	Isoctyl alcohol $C_8H_{17}OH$ $(C_8H_{18}O)$	001341419 (QX&&1X)	1480 rat	LD50:2520 skn-rbt	—	—
255	Isophorone (2-Cyclohexen-1-one, 3,5,5-trimethyl) $COCHC(CH_3)CH_2C(CH_3)_2CH_2$ $(C_9H_{14}O)$	000078591 (L6V BUTJ C D D)	2330 rat	TCLo:25 ppm TFX:IRR, ihl-hmn Kidney poison; irr; lachrymator LDLo:1840 ppm/4H, ihl-rat LD50:1500 mg/kg, skn-rbt LCLo:1840 ppm/4H, ihl-rat	USOS air: TWA 25 ppm or 140 mg/m^3	—
256 DP	Isophthalic acid $C_6H_4(CO_2H)_2$ $(C_8H_6O_4)$	000121915 (QVR CVQ)	—	LD50:4200 mg/kg, ipr-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See n-Butyraldehyde	278	—	—	173.6/1974	Intermediate for rubber antioxidants & accelerators, for neopentyl glycol; organic synthesis	1)667 2)494 3)749 4)582 12)
Oxidation (Isobutyraldehyde, air)	281	**Water:** Isobutyraldehyde, isobutyric acid, isobutanol (if used), **Air:** isobutyraldehyde	—	—	Manufacturing of esters for solvents, flavors, & perfume bases; disinfecting agent; deliming hides; varnish; tanning agent	1)673 2)494 3)750
—	—	—	—	—	Intermediate for metal salts, ester type lubricants, plasticizers; dental material	3)751 7)6-827
Oxo Process (Nonene, synthesis gas, cobalt naphthenate catalyst, then hydrogen and Ni or Cu chromite catalyst)	265	Same type pollutants as Processes 187 & 188	—	79.2/1973 81.7/1974	Antifoaming agent in textile processing; plasticizers; synthetic lubricants; uranium refining; solvent	1)642 2)495 3)751 7)1-568
Oxo Process (Heptene, rest same as 253 above)	266	Ditto **Emission factors:** H_2 - 10.0, CO - 3.0, isooctyl alcohol - 1.0, aldehydes - 1.0	—	55.4/1967 22.4/1973	Almost 100% synthesis of plasticizers (primarily phthalate)	1)644 2)498 7) 9)203 12) 13)40
Condensation & dehydration (Acetone, calcium oxide, hydroxide or carbide catalyst)	262	**Air:** acetone, mesityl oxide, diacetone alcohol, isophorone	—	—	In solvent mixtures for finishes; for polyvinyl & nitrocellulose resins; pesticides; stoving lacquers	1)635 2)329 3)753 5)561
Oxidation (m-Xylene, air, acetic acid solvent, bromine promoted cobalt salt catalyst)	361	**Water:** isophthalic acid, terephthalic acid, acetic acid **Emission factors:** CO - 21.0, hydrocarbons - 4.0	—	53.6/1974	Polyester, alkyd, polyurethane, & other high polymers; plasticizers; automotive industry; modi modifiers in fiber films, & adhesives	1)833 2)499 3)753 7)15-461 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
257	Isoprene $CH_2C(CH_3)CHCH_2$ (C_5H_8)	000078795 (1UY1U1)	—	Irr to muc mem of eyes, nose & upper respiratory tract; no data on hmn exposure LD50:144 mg/l air, ihl-mus	—	—
	Ditto	Ditto	—	Ditto	—	—
258	Isopropyl acetate (Acetic acid, isopropyl ester) $CH_3COOCH(CH_3)_2$ $(C_5H_{10}O_2)$	000108214 (1Y0V1)	3000 rat	TDLo:200 ppm eye-hmn Narcotic in high concen LDLo:32,000 ppm ihl-rat	USOS air: TWA 250 ppm or 950 mg/m^3	—
259	Isopropyl alcohol (2-propanol) $CH_3CHOHCH_3$ (C_3H_8O)	000067630 (QY)	5840 rat LDLo:192 mus LDLo:6150 dog	TCLo:400 ppm, TFX:IRR, ihl-hmn Local-irr & in high concen a narcotic; absorbed by the skn LD50:933 mg/kg, ipr-mus LD100:6000 mg/kg, scu-mus LDLo:1963 mg/kg, ivn-cat LD50:16000 mg/kg, skn-rbt LDLo:6 mg/kg, scu-mam	USOS air: TWA 400 ppm or 300 mg/m^3	—
260 DP	Isopropylamine $(CH_3)_2CHNH_2$ (C_3H_9N)	000075310 (ZY)	820 rat	Strong irr, sometimes sensitizes; narcotic in high concen LDLo:800 ppm/8H, ihl-rat LCLo:7000 ppm/40M, ihl-mus LD50:550 mg/kg, skn-rbt	USOS air: TWA 5 ppm or 12 ng/m^3 mg/m^3	—
	—	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Dehydrogenation (Isoamylenes, iron oxide, K_2CO_3, Cr_2O_3 catalysts)	247	**Water: kg/Mg** Isoprene (0.5), amylenes (1.5) **Air: kg/Mg** acetonitrile (5.0) **Emission factors:** hydrocarbons - 2.0	Absorber, stripper, debutanizer Shell acetonitrile process purifier	151.8/1971 182/1974	Monomer for manufacturing of polyisoprene; chemical intermediates	1)6-769 2)499 3)753 4)589 7)12-79 12)
Dehydrogenation (C_5 hydrocarbons (isopentane), chromia-alumina catalyst)	248	Ditto	Ditto	—	—	1)599
See ethyl acetate	103	**Emission factors:** isopropylacetate - 1.0 isopropanol - 1.0	—	—	Solvent for nitrocellulose, resin gums, etc.; paints, lacquers, & printing inks, organic synthesis	1)279 3)754 5)561 12)
Sulfation and hydrolysis, indirect hydration (Propylene, sulfuric acid, sodium hydroxide)	267	**Air:** possible propylene **Water:** isopropyl ether, hydrocarbons, propanoic acid, isopropanol, caustic soda	Scrubbers, hydrolyzer - stripper, decanter	833/1973 869/1974 777/1978	55% manufacturing of acetone & its derivatives, 2% amines, 3% glycerol, 2% isopropyl acetate; 8% coatings solvents; 3% rubbing alcohol; 3% deicing ingred; 3% drugs & cosmetics; solvents for essential & other oils, alkaloids, gums, resins, etc.; latent solvents for cellulose derivatives; aerosols; extraction processes; dehydrating agent; preservative	1)560 2)499 3)754 4)590 5)561 6)638 7)16-575 9)203 10) 13)40
Ammonia alkylation (Isopropyl alcohol, ammonia, aluminum phosphate catalyst)	271A	**Air:** isopropyl alcohol, isopropylamine, ammonia **Water:** ammonia, isopropyl alcohol, isopropylamine, other amines	Strippers	—	Solvent: intermediate in synthesis of rubber accelerator, pharmaceuticals, dyes; insecticides; bactericides, textile specialties, & surface-active agents; dehairing agents; solubilizer for 2,4-D acid	1)653 2)500 3)754 5)561 7)2-123
Reductive aminonolysis (Acetone, ammonia, hydrogen, Raney Ni catalyst)	271B	**Air & Water:** acetone, NH_3, amines	Ditto	—	—	—

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
261	Isopropyl chloride (propane, 2-chloro-) $CH_3CHClCH_3$ (C_3H_7Cl)	000075296 (GY)	—	Anesthetic; animal studies suggest moderate systemic toxicity	—	—
262	Isopropylphenol, o&p (phenol, p-isopropyl) $(CH_3)_2CHC_6H_4OH$ $(C_9H_{12}O)$	(QR XY) 000099898 (QR DY)	—	See phenol LDLo:250 mg/kg, ipr-mus	—	—
263	Ketene CH_2CO (C_2H_2O)	000463514 (OCU1)	1300 rat	Pulmonary edema LCLo:23 ppm/30M, ihl-mus LCLo:53 ppm/100M, ihl-rat LCLo:53 ppm/4H, ihl-gpg LCLo:200 ppm/10M, ihl-mky	USOS air: TWA 0,5 ppm or 0.9 mg/m^3	—
264	Maleic acid $HOOCCHCHCOOH$ $(C_4H_4O_4)$	000110167 (QV1U1VQ-C)	708 rat 2400 mus	LD50:1560 mg/kg, skn-rbt	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
265	Maleic anhydride $OCOCHCHCO$ $(C_4H_2O_3)$	000108316 (T5VOVJ)	60 mus 465 mus 481 rat LDLo:850 rat	Ihl toxicity high - pulmonary edema. Burns skin, eyes, & muc mem	USOS air: TWA 0.25 ppm or 1 mg/m^3	TDLo:610 mg/kg/61W TFX:CAR, scu-rat
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Substitution, Chlorination (Isopropyl alcohol, hydrochloric acid)	268	**Air & Water:** isobutyl alcohol, isopropyl chloride, hydrogen chloride	—	—	Solvent; intermediate; isopropylamine	1)648 3)755
Friedel-Crafts Reaction (Phenol, isopropyl chloride, $AlCl_3$, BF_3 or H_2SO_4 catalyst)	272	**Air:** May contain HCl, isopropyl, chloride, byproducts **Water:** NaCl, NaOH, phenol, isopropyl chloride, isopropyl phenol, spent catalyst	HCl scrubber, still bottom tars incinerated	—	Intermediate for synthesis resins, plasticizers, surface active agent, perfumes	1)655 2)645 3)757
Pyrolysis (Acetone)	263A	**Air:** methane, acetone, acetic acid	—	—	Acetylating agent generally reacting with compounds having an active hydrogen atom; reacts with ammonia to give acetamide; starting point for making various commercially important products, especially acetic anhydride & acetate esters	1)637 2)509 3)761 5)561
See maleic anhydride, Process 38 (Maleic anhydride, water)	41	—	—	—	Organic synthesis (maleic, succinic, aspartic, tartaric, propionic, lactic, malonic, acrylic, hydracrylic acids); dyeing & finishing of cotton, wool & silk; preservative for oils & fats	1)131 2)521 3)784
See phthalic anhydride	220 & 360	—	—	—	Ditto	Ditto
Oxidation (Air, benzene, vanadium pentoxide on carrier catalyst)	38	**Air:** benzene (131 kg/Mg), CO (780 kg/Mg), maleic acid **Water:** kg/Mg maleic anhydride (3.8), high boilers (27), maleic acid (0.6) **Emission factors:** CO 1560, benzene - 262.0	—	128/1973 132/1974 151/1978	50% manufacturing polyester resins; 15% fumaric acid; 10% pesticides; 5% alkyd resins; preservative for oils & fats; paper; permanant-press resins (textiles); plastics; lubricants; copolymers	1)125 2)521 3)785 5)561 6)639 7)12-832 11)37 12) 13)40
Oxidation (Butenes, air, Mo, Va, Poxide catalysts on silica gel)	61	**Air:** butenes, CO, CO_2, maleic acid **Water:** maleic anhydride, maleic acid, high boilers	—	Ditto	Ditto	1)176

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See above item	See above item	See above item	See above item	See above item	See above item
266	Malic acid $HO_2CCHOHCH_2CO_2H$ $(C_4H_6O_5)$	006915157 (QVYQIVA-L)	LDLo:1600 rat LDLo:5000 rbt	Moderate toxicity	—	—
267	Mesityl oxide (3-Penten-2-one, 4-methyl-) $(CH_3)_2CCHCOCH_3$ $(C_6H_{10}O)$	000141797 (1YU1V1)	1120 rat 1000 rbt	LCLo:25 ppm TFX:IRR, ihl-hmn Moderate toxicity based in animal studies. Narcotic in high concen; injury to liver, kidneys & lungs. Readily absorbed through skn LCLo:1000 ppm/4H, ihl-rat LD50:354 mg/kg, ipr-mus	USOS air: TWA 25 ppm or 100 mg/m^3	—
268	Methacrylic acid $CH_2(CH_3)CCOOH$ $(C_4H_6O_2)$	000079414 (QVYU1)	—	Highly irr to skn, eyes, muc mem LD50:48 mg/kg, ipr-mus	—	—
	Ditto	Ditto	—	Ditto	—	—
269	Methacrylic esters CH_3CH_2CCOOR $(C_4H_5O_2R)$	—	—	—	—	—
—	Methyl methacrylate, see 64ADD					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See phthalic anhydride	220 & 360	—	—	—	Ditto	—
Hydration (Maleic acid, H_2O, O_2, Co catalyst)	42	—	Ion exchanger	—	Mainly food acidulant; medicine; manufacture of various esters & salts; wine manufacture; chelating agent; flavoring	1)133 3)521 3)785 7)12-847 13)40
Dehydration (Diacetone alcohol, sulfuric acid)	259	**Water:** acetone, diacetone alcohol	—	—	Solvent for cellulose esters & ethers, oils, gums, resins, lacquers, roll-coating inks, stains, ore flotation; paint & varnish removers; insect repellent	1)630 2)623 3)799 5)561
Oxidation (Isobutylene, nitric acid, possibly N_2O_4)	66	**Air:** Presumed isobutylene and oxidation products	—	30.9/1968	Monomer for large volume resins & polymers; organic synthesis, many of the polymers are based on esters of the acid, as the methyl, butyl, or isobutyl esters (see acrylic resin)	1)184 2)533 3)800 4)668
Hydrolysis (Acetone cyanohydrin, sulfuric acid, water, inhibitors)	171	**Air:** Trace methacrylic acid **Water:** Methacrylic acid, inhibitors	Acid stripper rectifier, wash column	Ditto	Ditto	1)433
Esterification (Acetone cyanohydrin, sulfuric acid, alcohols, inhibitors)	172	**Air:** methacrylic acid, alcohol **Water:** mg/l COD - 1.78×10^5 BOD_5 - 2.07×10^5 TOC - 6.99×10^5 methacrylic acid, alcohols, inhibitors	—	321/1973 (Methyl methacrylate)	Almost all polymers & copolymers	1)435

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
270	Methacrylonitrile (2-Propenenitrile, 2-methyl-) H_2CCCH_3CN (C_4H_5N)	000126987 (NCYU1)	250 rat LDLo:15 mus	Poison LC50:328 ppm/4H, ihl-rat LC50:36 ppm/4H, ihl-mus LDLo:15 mg/kg, ipr-mus LC50:37 ppm/4H, ihl-rbt LD50:320 mg/kg, skn-rbt	USOS air: TWA 1 ppm (skn)	—
271	Methallyl alcohol (2-Propen-1-ol, 2-methyl) $CH_3CHCHCH_2OH$ (C_4H_8O)	000513428 (Q1YU1)	LDLo:500 mus	LCLo:2924 ppm/2H, ihl-mus LDLo:2000 mg/kg, skn-rbt	—	—
272	Methallyl chloride (Propene, 3-chloro-2-methyl) $CH_3CHCHCH_2Cl$ (C_4H_7Cl)	000563473 (G1YU1)	—	LC50:2000 mg/m^3/24H, ihl-rat LCLo:9100 mg/m^3/10M ihl-mus	—	—
273	Methyl acetate (Acetic acid, methyl ester) $CH_3CO_2CH_3$ ($C_3H_6O_2$)	000079290 (1VO1)	3700 rbt LDLo:4800 rat	Narcotic; irr to muc mem of eyes & upper respiratory tract LDLo:80 mg/m^3/31M, ihl-mus LCLo:67 mg/m^3/56M, ihl-cat LDLo:3000 mg/kg, scu-cat LDLo:3000 mg/kg, scu-gpg	USOS air: TWA 200 ppm or 610 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
274 DP	Methyl acetoacetate (Acetoacetic acid, methyl ester) $CH_3COCH_2COOCH_3$ ($C_5H_8O_3$)	000105453 (1V1VO1)	3000 rat	Unknown	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ammoxidation (Isobutylene, ammonia, air)	65	**Air:** kg/Mg methacrylonitrile (5), CO (200), isobutylene (100), HCN (1), ammonia (trace) **Water:** ammonium sulfate, possibly acetonitrile	Absorber off gas to flare	—	Vinyl nitrile monomer; copolymer with styrene, butadiene, etc.; elastoplastics	1)182 2)765 3)800
Substitution, Hydrolysis (Methallyl chloride, sodium hydroxide, H_2O)	64	**Water:** NaOH, NaCl, methallyl alcohol, methallyl chloride	—	—	Intermediate	1)181 2)766 3)800
Chlorination (Isobutylene, chlorine)	63	**Air:** Some Cl_2 and HCl may occur	Heavy ends may be incinerated	—	Intermediate for production of insecticides, plastics, pharmaceutical, other organic chemicals; fumigant for grains, tobacco, & soil	1)180 2)765 3)800 7)10-728
Esterification (Methanol, acetic acid, sulfuric acid catalyst)	194	**Water:** methyl acetate, methanol, acetic acid, sulfuric acid **Air:** methanol, methyl acetate **Emission factors:** methanol - 1.0 methyl acetate - 1.0	—	—	Paint remover compounds; lacquer solvent, intermediate, solvent for cellulose nitrate, cellulose acetate, resins & oils; artificial leather	1)487 2)30 3)805 5)561 7)8-378 12)
See acetic acid	227	—	—	—	Ditto	1)560
Claisen Reaction, Sodium fusion (Methyl acetate, sodium, methanol solvent, sulfuric acid)	195	**Air:** hydrogen **Water:** sodium salts, methanol, sulfuric acid	—	—	Solvent for cellulose ethers; ingred of solvent mixtures for cellulose esters; organic synthesis	1)489 2)35 3)805

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
275	Methyl alcohol (Methanol)	000067561 (Q1)	LDLo:420 mus LDLo:7500 dog LDLo:7500 rbt	LDLo:340 mg/kg, orl-hmn TDLo:100 mg/kg, TFX:EYE, orl-hmn TCLo:300 ppm TFX:CNS, ihl-hmn Narcotic; slight irr to muc mem; CNS effects; coma; cumulative poison LDLo:1800 mg/kg, ipr-rat LD50:9800 mg/kg, scu-mus LC50:1000 ppm, ihl-mky	USOS air: TWA 200 ppm or 260 mg/m^3	--
276 DP	Methylamine CH_3NH_2 (CH_5N)	000074895 (Z1)	--	Strong irr LDLo:2500 mg/kg, scu-mus LDLo:2000 mg/kg, scu-frg	USOS air: TWA 10 ppm or 12 mg/m^3	--
277	M-Methylaniline (Aniline, N-methyl) $C_6H_5NHCH_3$ (C_7H_9N)	000100618 (1MR)	LDLo:280 rbt LDLo:1200 gpg	Both liquid & vapor can be absorbed through the skn LDLo:24 mg/kg, ivn-cat LDLo:24 mg/kg, ivn-rbt LDLo:1200 mg/kg, scu-gpg	USOS air: TWA 2 ppm (skn) or 9 mg/m^3 (skn)	--
	Ditto	Ditto	Ditto	Ditto	Ditto	--

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
(Synthesis, or syn gas - $CO+2H_2$, Cr & Zn oxide catalysts)	191	**Water:** oils, methanol, higher boiling organic compounds Plant 1: Flow - 0.492 m^3/kg COD - 320 mg/l - 0.16 g/kg BOD_5 - 119 mg/l - 0.059 g/kg TOC - 107 mg/l - 0.053 g/kg Plant 2: Flow - 0.352 m^3/kg COD - 4930 mg/l - 1.74 g/kg BOD_5 - 2620 mg/l - 0.92 g/kg TOC - 583 mg/l - 0.21 g/kg	--	--	Solvent for cellulose ethers; ingred of solvent mixtures for cellulose esters; organic synthesis	1)489 2)35 3)805
Ammonolysis (Methanol, ammonia alumina catalyst)	192	**Air:** hydrogen, carbon monoxide, methylamines **Water:** methylamine, dimethylamine, trimethylamine	--	16.8/1973 24.9/1974	Manufacture: 11% Sevin insecticide, 8% surfactants (e.g., acylmethyltaurins salts), rocket propellant (Methyl hydrazine); intermediate for accelerators, dyes, pharmaceuticals, fungicides, surface active agents, tanning; dyeing acetate textiles; fuel additive; polymerization inhibitor; component of paint removers	1)481 2)550 3)840 5)561 7)2-122 9)200 10) 13)41
Alkylation (Aniline, methanol, hydrogen, alumina/CaO_2 catalyst)	12	**Air:** methanol, aniline, methylaniline, N,N-dimethylaniline	--	--	Organic synthesis; solvent; acid acceptor	1)71 2)98 5)561
Alkylation (Aniline, methyl iodide)	14	**Water:** NaI, NaOH, methyl iodide, aniline, methyl-aniline, dimethylaniline **Air:** methyl iodide, HI	Acid scrubber	--	Ditto	1)73 3)910

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
278	Methybutynol (3-Butyn-2-ol,2 methyl-) $(CH_3)_2COHCCH$ (C_5H_8O)	000115195 (QX1UU1)	--	LD50:3600 mg/kg, ipr-mus	--	--
279	Methyl chloride (Methane, chloro) CH_3Cl	000074873 (G1)	--	Slight irr & narcotic; CNS damage from exposure to high concentrations or repeated exposure; some liver, kidney, bone marrow & cardiovascular damage. Death may occur immediately or several days after exposure LC50:3146 ppm/7H ihl-mus LCLo:15,000 ppm/7H ihl-dog LDLo:128,700 mg/m^3/4H ihl-cat LCLo:3000 ppm/4H, ihl-rat LCLo:20,000 ppm/2H, ihl-gpg	USOS air: TWA 100 ppm; or 210 mg/m^3; CL 200 ppm; PK 300 ppm/5M/3H	--
	Ditto	Ditto	--	Ditto	Ditto	--
280	Methylcyclohexane (Cyclohexane, methyl) $CH_3C_6H_{11}$ (C_7H_{14})	000108872 (L6TJ A)	LCLo:4000 rbt	LDLo:500 mg/kg, orl-hmn Lethal in high concen. Narcosis & anesthesia in sublethal doses	USOS air: TWA 500 ppm or 2000 mg/m^3	--
281	Methylcyclohexanol (Cyclohexanol, methyl) $CH_3C_6H_{10}OH$ $(C_7H_{14}O)$	025639423	1660 rat LDLo:1750 rbt	TCLo:500 ppm TFX:IRR, ihl-hmn LD50:2900 mg/kg, scu-rat	USOS air: TWA 100 ppm or 470 mg/m^3	--

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ethylnylation (Acetylene, acetone, ammonia, sodamide catalyst)	177	**Air:** acetylene, ammonia, solvents **Water:** salts & heavy by products	—	—	Stabilizer in chlorinated solvent; viscosity reducer & stabilizer; electroplating brightener; intermediate; metal working; rubber cement; perfumes	1)446 3)812 7)1-624
Chlorination (Methane, chlorine, sodium hydroxide, sulfuric acid)	157	**Air: kg/Mg** CH_4 (1), CH_3Cl (13), CH_2CL_2 (2), $CHCl_3$ (1), CCl_4 (1) **Water:** HCl, sodium hydroxide, sulfuric acid **Emission factors:** CH_4 - 1 lb/ton CH_3Cl - 13 lb/ton, CH_2Cl_2 - 2 lb/ton, $CHCl_3$ - 1 lb/ton, CCl_4 - 1 lb/ton	HCl absorber, caustic washer	247/1973 207/1974 206/1978	Manufacturing: 38% chlorosilanes (silicone intermediates), 38% tetramethyl lead; catalyst carrier in low-temperature polymerization (butyl rubber); 4% methylating agent in organic synthesis, such as methylcellulose; 4% herbicide, 3% quatamines; extractant & low-temperature solvent, growing important as propellant in high-pressure aerosols	1)404 2)536 3)813 5)563 6)619 7)5-110 9)205 10) 12) 13)41
Substitution, Chlorination (Methanol, HCl, alumina gel or other catalyst)	193	—	—	Ditto	Ditto	1)485
Hydrogenation (Toluene, hydrogen, Ni or Pt catalyst)	350	**Air or Water:** Rearranged hydrocarbons	—	—	Solvent for cellulose ethers; organic synthesis	1)805 2)326 3)815 5)561
Oxidation, Partial Oxidation (Methyl cyclohexane, oxygen, metaboric acid, catalyst, NaOH)	351	**Air:** some cyclohexene **Water:** spent caustic and cyclohexanol	—	—	—	1)807 2)327 3)815 5)561

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
282	Methylcyclohexanone (Cyclohexanone, 2-methyl) $COCH(CH_3)CH_2CH_2CH_2CH_2$ ($C_7H_{12}O$)	001331222 (L6VTJ B *DXLV)	2140 rat LDLo:1000 rbt	Kidney & liver damage LD50:200 mg/kg ipr-mus	USOS air: TWA 100 ppm (skn) or 460 mg/m^3 (skn)	—
283	Methyldioxolane (Dioxolane, methyl) $OCH(CH_3)OCH_2CH_2$ ($C_4H_8O_2$)	001331095	3000 rat	Moderate oral toxicity	—	—
284	Methylene chloride (Methane, dichloro) (Dichloromethane) CH_2Cl_2	000075092 (G1G)	945 rat 2136 rat LDLo:300 dog LD100:1900 rbt	LD50:500 mg/kg, orl-hmn TCLo:500 ppm/1YI, TFX:CNS, ihl-hmn TCLo:500 ppm/8H, TFX:BLD, ihl-hmn Strong narcotic; anesthetic; dermatitis; dangerous to the eyes LC50:14,400 ppm/7H, ihl-mus LCLo:20,000 ppm/7H, ihl-dog LD50:1500 mg/kg, ipr-mus LD50:6460 mg/kg, scu-mus LD100:950 mg/kg, ipr-dog LDLo:2700 mg/kg, scu-dog LDLo:200 mg/kg, ivn-dog LDLo:2700 mg/kg, scu-rbt LCLo:5000 ppm/2H, ihl-gpg	USOS air: TWA 500 ppm; CL 1000 ppm; PK 2000 ppm/5M/2H	—
285 DP	Methylenedianiline (Aniline, 4,4'-methylenedi-) $CH_2(C_6H_4NH_2)_2$ ($C_{13}H_{14}N_2$)	000101779 (ZR DIR DZ)	347 rat	TDLo:8.42 mg/kg, orl-man Moderately high acute oral toxicity LD50:200 mg/kg, scu-rat	—	TDLo:80 mg/kg, TFX:CAR, orl-rat TDLo:1410 mg/kg, TFX:NEO, scu-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation, Dehydrogenation (Methyl cyclohexanol, air, Ag or Cu catalyst)	352	**Air:** methyl cyclohexanol, methyl cyclohexanone **Water:** methyl cyclohexanone	—	—	Solvent; lacquers; solvent for cellulose esters & ethers for lacquers, antioxidant for lubricants; blending agent for special textile soaps & detergents	1)809 2)327 3)815 5)561
Condensation (Ethylene glycol, acetaldehyde, acid catalyst)	148	**Water:** acetaldehyde, ethylene glycol, methyl dioxolane	—	—	Extractant & solvent for oils, fats, waxes, dyestuffs, & cellulose derivatives	1)380 2)372 3)819
Chlorination (Methane, chlorine)	158	**Air: kg/Mg** CH_4 (1), CH_3Cl (13), CH_2Cl_2 (2), $CHCl_3$ (1), CCl_4 (1), Cl_2 **Water:** hydrochloric acid, sodium hydroxide, NaCl **Emission factors:** Same as Air	—	236/1973 264/1974 258/1978	40% paint removers; 20% exports; 17% aerosol sprays; 10% degreasing solvent; 6% plastic processing; blowing agent; special photo film; fumigant; solvent mixtures for cellulose esters & ethers; textile & leather coatings; refrigeration; local anesthetic; pharmaceutical & food extraction; spotting agent; dewaxing; chemical (organic synthesis)	1)406 2)536 3)921 6)619 7)5-117 9)205 10) 12) 13)41
Condensation (Aniline, formaldehyde, hydrochloric acid, ammonium hydroxide)	204	**Water:** ammonium hydroxide, ammonium chloride, & aniline compounds	—	90.9/1975	99% manufacture isocyanates (MDI & polyisocyanates) for polyurethanes; epoxy hardener; rubber curing agent & antioxidant	1)506 2)98 3)820 14)3

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
286	Methyl ethyl ketone 2-Butanone $CH_3COCH_2CH_3$ (C_4H_8O)	000078933 (2V1)	3400 rat	LDLo:500 mg/kg, orl-hmn TCLo:100 ppm/5M TFX:IRR, ihl-hmn Local irr & narcotic, affects peripheral nervous system TCLo:1000 ppm/ (6-15D preg) TFX:TER, ihl-rat LCLo:2000 ppm/ 4H, ihl-rat LDLo:2000 mg/kg, ipr-rat LD50:616 mg/kg, ipr-mus	USOS air: TWA 200 ppm or 590 mg/m^3	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
287	Methyl formate (Formic acid, methyl ester) $HCOOCH_3$ ($C_2H_4O_2$)	000107313 (VHO1)	1620 rbt	LDLo:500 mg/kg, orl-hmn Irr to eyes LDLo:10,000 ppm, ihl-gpg	USOS air: TWA 100 ppm or 250 mg/m^3	—
288	Methyl isobutyl carbinol (Methyl amyl alcohol) (4-methylpentanol-2) $(CH_3)_2CHCH_2CHOHCH_3$ ($C_6H_{14}O$)	000105306 (Q1Y3)	1410 rat	TCLo:50 ppm, TFX:IRR, ihi-hmn Strong irr; anesthesia LD50:3560 mg/kg, skn-rbt	USOS air: TWA 25 ppm or 100 mg/m^3	—
289	Methyl isobutyl ketone (2-Pentanone, 4-Methyl) $(CH_3)_2CHCH_2COCH_3$ ($C_6H_{12}O$)	000108101 (1Y1V1)	2080 rat LDLo:2850 mus	LDLo:500 mg/kg, orl-hmn TCLo:200 ppm, TFX:IRR, ihl-hmn Irr to eyes & muc mem; narcotic	USOS air: TWA 100 ppm or 410 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation, Dehydrogenation (See Butyl alcohol, ZnO catalyst)	56	**Water:** methyl ethyl ketone, byproducts	—	230/1974 246/1973 272/1978	Solvent: 34% vinyl coatings, 14% nitrocellulose, 14% adhesives, 12% acrylic coatings, 7% misc coatings, 7% lube oil dewaxing, 6% misc including alkyds; paint removers; cements & adhesives; organic synthesis cleaning fluids; printing; catalyst carrier	1)164 2)242 3)438 5)560 6)643 11)37 12) 13)41
See acetic acid	227	**Emission factors:** n-butyl alcohol - 1.0	—	Ditto	Ditto	1)560
See allyl alcohol (Acrolein, 2-butanol, metal oxide catalyst)	251B	—	—		—	1)616
Carbonylation, esterification (Methanol, syn gas or CO+H_2. sodium methoxide catalyst)	198	**Air and Water:** dimethyl ether, tars	—	—	Organic synthesis; cellulose acetate solvent; military poison gases; fumigant; larvicides; food additive for human consumption	1)494 2)431 3)822
Hydrogenation (Methyl isobutyl ketone, hydrogen, catalyst)	261	**Air:** methyl isobutyl ketone, methyl isobutyl, carbinol, byproducts	—	15.9/1973	Solvent for dyestuffs; oils, gums, resins, waxes, nitrocellulose & ethylcellulose; organic synthesis, froth flotation; brake fluids	1)633 2)621 3)807 5)561 6)644A
Hydrogenation (Mesityl oxide, hydrogen, Cu or Raney Ni catalyst)	260	**Air:** mesityl oxide, methyl isobutyl ketone, methyl isobutyl carbinol, byproducts **Emission factors:** hydrocarbons - 84.6	—	70.3/1973 94.2/1974	Solvent: 35% nitrocellulose, 25% vinyl coatings & inks; 10% pharmaceuticals; 10% methyl isobutyl carbinol; 5% magnetic tape; 4% adhesives; 11% miscellaneous,	1)631 2)622 3)750 5)561 6)644A 12) 13)41

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
289 (Continued)				LCLo:4000 ppm/ 15M, ihl-rat LD50:268 mg/kg, ipr-mus		
290	Methyl pentynol (1-Pentyn-3-ol, 3-methyl-) $HCCC(OH)CH_3C_2H_5$ $(C_6H_{10}O)$	000077758 (QX2&1UU1)	300 rat 534 gpg 760 mus 2)625 698 mus 3)829	LDLo:500 mg/kg, orl-hmn TDLo:70 mg/kg, TFX:CNS, orl-hmn Soporific; average doses may produce dermatitis; eructations; psychoses & CNS abnormalities; overdoses produce coma & death LD50:750 mg/kg, scu-mus	—	—
291	Methylphenylcarbinol (Phenylmethylcarbinol) (Ethanol, 1-phenyl) (Benzy alcohol, α-methyl) $C_6H_5CH(CH_3)OH$ $(C_8H_{10}O)$	000098851 (QYR)	400 rat	Limited animal studies show low toxicity LD50:2500 mg/kg, skn-rbt	—	—
—	Methylsalicylate, see 66ADD					
292 DP	α-Methylstyrene (Styrene, α-methyl) $C_6H_5{\cdot}C_3H_5$ (C_9H_{10})	000098839 (1YR&U1)	4900 rat	TCLo:600 ppm, TFX:IRR, ihl-hmn Immediate death caused by action on CNS; delayed death due to pnemonia LCLo:3000 ppm, ihl-rat LCLo:3000 ppm, ihl-gpg	100 ppm; 480 mg/m^3	—
293	Monopropylene glycol (Propylene glycol) (1,2-Propanediol) $CH_3CH(OH)CH_2OH$ $(C_3H_8O_2)$	000057556 (QY1Q)	30,000 rat 24,000 mus 22,000 dog	LD50:13,000 mg/ kg, ipr-rat LD50:28,000 mg/ kg, scu-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					including 3% extraction uranium from fission products	
Ethynylation, Acetylation (2-Butanone, acetylene, dimethylacetal of formaldehyde, solvent alkali or alkaline earth oxide catalysts)	178	**Air:** reactants **Water:** catalyst salts and heavy byproducts	—	—	Stabilizer in chlorinated solvent; viscosity reducer; electroplating brightening; intermediate in synthesis of hypnotics & isoprenoid chemical; solvent for polyamide resins; acid inhibitors; prevention of hydrogen embrittlement; medicine (soporific & anesthetic)	1)448 2)625 3)829
Grignard Reaction, Addition (Acetaldehyde, benzene, bromine, magnesium)	92	**Air:** Ether and bromobenzene **Water:** bromine, hydrogen bromide, sodium bromide, sodium hydroxide	—	—	Perfumery; flavoring; dyes; laboratory reagent	1)253 2)222 3)1017
Dehydrogenation (Cumene, iron oxide catalyst)	296	**Water:** aromatic hydrocarbons, tars, spent catalyst	Organic solid, from still bottoms incinerated	23.8/1973 26.1/1974	Polymerization monomer, especially for polyester; foods; plasticizers for paints, waxes, adhesives, 7 plastics	1)701 2)875 3)832 7)19-83 9)23 12)
See Dipropylene glycol, 181	287	**Emission factors:** propylene glycol - 3.0	—	228/1973 250/1978	52% manufacture polyester resins; 8.5% cellophane; 7.5% tobacco humectant; 7% plasticizers; 4% brake fluids; emulsifiers & food add	1)684 2)745 3)943 12) 13)44

(Continued

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
294 DP	Morpholine $\overline{OCH_2CH_2NHCH_2CH_2}$ (C_4H_9NO)	000110918 (T6M DOTJ)	1050 rat	LDLo:50 mg/kg, orl-hmn LD50:500 mg/kg, skn-rbt LD50:413 mg/kg, ipr-mus	USOS air: TWA 20 ppm (skn) or 70 mg/m^3 (skn)	—
295 DP	Naphthalene $(C_{10}H_8)$	000091203 (L66J)	1780 rat	LDLo:50 mg/kg, orl-hmn LDLo:100 orl-chd Systemic reactions include nausea, headache, diaphoresis, hematuring fever, anemia, liver damage, convulsions, coma LD50:150 mg/kg, ipr-mus	USOS air: TWA 10 ppm; 50 mg/m^3	TDLo:3500 mg/kg/ 98DI TFX:NEO, scu-rat
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
296	1-Naphthalene sulfonic acid $C_{10}H_7{\cdot}SO_3H{\cdot}2H_2O$ $(C_{10}H_8O_3S)$	000085472 (L66J BSWQ)	—	—	—	—
297	2-Naphthalene sulfonic acid (2-Naphthalene sulfonic acid) $C_{10}H_7{\cdot}SO_3H{\cdot}H_2O$ $(C_{10}H_8O_3S)$	000120183 (L66J CSWQ)	400 rat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Condensation, Ammonolysis (Diethanolamine, sulfuric acid)	153	**Water:** diethanolamine, extraction solvent, morpholine, alkali sulfate	—	—	Rubber accelerator & stabilizer; solvent; organic synthesis; additive to boiler water; waxes & polishes; corrosion inhibitor; optical brightener for detergents; lubricating oil; wrapping paper; coating for fruits & vegetables; pharmaceuticals; bactericides; textiles; photochemicals; gasoline additive; herbicide	1)388 2)560 3)841 5)561 7)13-665
Separation, see Acenaphthene	208	**Air:** May contain paraffins, olefins, low boiling aromatics, furfural, SO_2	—	164/1973	57% manufacture phthalic anhydride; synthesis: 20% insecticide (1-naphthyl-N-methyl carbamate), 9% β-naphthol, 7% tanning agents; 3% moth repellant; 1% surfactants; misc. plasticizers; dye intermediate pigments	1)517 2)565 3)843 5)561 7)13-686 9)11 13)42
Hydrocarbon, desulfurization (Napthalene feed, hydrogen, cobalt molybdate catalyst)	209	**Air and Water:** H_2S, NH_3, mercaptans	—	Ditto	Ditto	1)519
Sulfonation (Naphthalene, sulfuric acid, lime, soda ash)	217	**Air:** SO_2, naphthalene **Water:** calcium carbonate, sodium carbonate, sodium sulfate, naphthalene, naphthalene sulfonates	—	—	Starting point in the manufacture of alpha-naphthol, alpha-naphtholsulfonic acid, alpha-naphthylaminesulfonic acid; solvent (sodium salt) for phenol in the manufacture of disinfectant soaps	1)533
Sulfonation (Naphthalene, sulfuric acid, sodium chloride, water)	218	**Water:** sodium chloride, sodium sulfate, sodium hydroxide	—	—	Starting point in the manufacture of beta-naphthol, beta-naphtholsulfonic acid, beta-naphthylaminesulfonic acid; leather tanning agents	1)535 2)577 13)42

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
298 DP	1-Naphthol (α-Naphthol) $C_{10}H_7OH$ ($C_{10}H_8O$)	000090153 (L66J BQ)	2590 rat 3800 rbt	LDLo:50 mg/kg, orl-hmn In hmn large ingestions result in nephritis, vomiting, diarrhea, circulatory collapse, anemia, convulsions & death. Abs through skn may cause kidney & eye damage. LD50:880 mg/kg, skn-rbt	—	—
299 DP	2-Naphthol (β-Naphthol) $C_{10}H_7 \cdot OH$ ($C_{10}H_8O$)	000135193 (L66J CQ)	2420 rat LDLo:3800 rbt	LDLo:50 mg/kg, orl-hmn See 1-naphthol LDLo:2940 mg/kg, scu-rat LDLo:100 mg/kg, scu-mus LDLo:2670 mg/kg, scu-gpg	—	—
—	1-Naphthylamine, see 67ADD and 633, Table B-2, Dye Intermediates					
300	Neopentanoic acid (Pivalic acid) (Trimethylacetic acid) $(CH_3)_3CCOOH$ ($C_6H_{10}O_2$)	000075989 (QVX)	LDLo:5000 rat	—	—	—
	Ditto	Ditto	Ditto	—	—	—
—	o- and p-Nitroanilines, see 97 & 98, Table B-2, Dye Intermediates					
301G DP	Nitroanisole, o&p	(WNR X01)	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Hydrolysis (1-Naphthylamine, sulfuric acid, water)	212	Water: ammonium sulfate, sulfuric acid, 1-naphthylamine, 1-naphthol	—	—	Dyes; organic synthesis; synthetic perfumes; intermediates; pharmaceuticals; insecticides	1)524 2)582 3)844 4)715 7)13-717
Substitution & acidification, fusion & decomposition (2-Naphthalenesulfonic acid, sodium hydroxide, sulfuric acid)	219	Water: sodium sulfate, naphthalenesulfonic acid, naphthols	—	10.8/1955	Dyes; pigments; antioxidants for rubber fats, oils; insecticides; synthesis of fungicides; pharmaceuticals, perfumes; intermediate	1)537 2)582 3)844 7)13-717
Oxidation (Tert-butyl alcohol, formic acid, sulfuric acid)	74A	Water: Reactants and products, H_2SO_4	—	—	Intermediate, as a replacement for some natural materials	1)198 2)733
Oxidation (Isobutylene, carbon monoxide, sulfuric acid)	74B	Air: CO, isobutylene Water: H_2SO_4, crude product	—	—	Ditto	1)198
Methylation (o- and p- nitrophenol, dimethyl sulfate, sodium hydroxide, water)	309	Air: dimethyl sulfate, methanol Water: dimethyl sulfate, methanol, sodium hydroxide, sodium sulfate	—	—	Organic synthesis; manufacture of intermediates for dyes & pharmaceuticals	1)726 2)102 3)856

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
301	p-Nitroanisole $CH_3O{\cdot}C_6H_4{\cdot}NO_2$	029191535 (WNR DO1)	4700 rat	LD50:1400 mg/kg, ipr-man	—	—
302 DP	Nitrobenzene (Benzene, nitro) $C_6H_5NO_2$	000098953 (WNR)	640 rat LDLo:700 rbt LDLo:750 dog LDLo:2000 cat	LDLo:5 mg/kg, orl-hmn TDLo:200 mg/kg, TFX:BLD orl-wmn Cyanosis due to formation of methemoglobin LDLo:800 mg/kg, scu-rat LDLo:400 mg/kg, skn-mus LDLo:150 mg/kg, ivn-dog LDLo:600 mg/kg, skn-rbt	USOS air: TWA 1 ppm (skn) or 5 mg/m^3 (skn)	—
303G DP	Nitrobenzoic acid (o, p, m) $NO_2C_6H_4COOH$ $(C_7H_5NO_4)$	— (WNR XVQ)	—	—	—	—
303	Benzoic acid, o-nitro	029809244 (WNR BVQ)	—	—	—	—
304	Benzoic acid, p-nitro	000062237 (WNR DVQ)	1960 rat	Animal studies suggest moderate toxicity LD50:1210 mg/kg, ipr-rat LD50:1960 mg/kg, par-rat LD50:880 mg/.kg, ipr-mus LD50:1470 mg/kg, ivn-mus LD50:1470 mg/kg, par-mus	—	—
305	Benzoic acid, m-nitro	000121926 (WNR CVQ)	—	LD50:670 mg/kg, ipr-rat LD50:680 mg/kg, ivn-rat LD50:1820 mg/kg, par-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See item above	See item above	See item above	——	——	See item above	See item above
Nitration (Benzene, sulfuric acid, nitric acid, sodium carbonate)	25	**Air:** kg/Mg benzene (8.2) NO_x (0.25) **Water:** benzene, nitrobenzene	Acid separator	140.1/1973	97% manufacture aniline; 3% solvent (e.g., cellulose ethers & a selective solvent in the petroleum industry) & synthetic dichloroanilines; dyes; ingredient of metal polishes & shoe polishes; manufacture of benzidine, quinoline, azobenzene; lubricating oil; rubber chemical; photo chemicals; drugs; solvent for Friedel Crafts reactions	1)97 2)161 3)857 4)737 5)562 6)608 7)13-840 9)23 13)42
Oxidation (Nitrotoluene, permanganate for ortho, chromic acid for meta and para)	339	**Water:** chromium or potassium salts	——	——	Organic synthesis, preparation of anesthetics & as intermediate in the manufacture of dyes & sunscreening agents	1)764 3)857
Ditto See above	Ditto	**Water:** Potassium salts	——	——	Ditto	1)764
Ditto See above	Ditto	**Water:** Chromium salts	——	——	Ditto	1)764 2)195 3)857
Ditto See above	Ditto	**Water:** Chromium salts	——	——	Ditto	1)764 2)195 3)857

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
305 (Continued)				LD50:610 mg/kg, ipr-mus LD50:640 mg/kg, ivn-mus LD50:1290 mg/kg, par-mus		
	See above item	See above item	—	See above item	—	—
306	Nitroethane (Ethane, nitro-) ($C_2H_5NO_2$)	000079243 (WN2)	1100 rat 860 mus LDLo:500 rbt	Injury to liver & kidneys of experimental animals	USOS air: TWA 100 or 310 mg/m^3	—
307	Nitromethane (Methane, nitro-) (CH_3NO_2)	000075525 (WN1)	940 rat 950 mus LDLo:125 dog LDLo:750 rbt	LDLo:500 mg/kg, orl-hmn May cause anorexia, nausea, vomiting, & diarrhea in hmn; kidney & liver damage LDLo:565 mg/kg, scu-dog LDLo:800 mg/kg, ivn-dog LCLo:2446 mg/m^3 ihl-mky LDLo:750 mg/kg, ivn-rbt	USOS air: TWA 100 ppm or 250 mg/m^3	—
—	1-Nitronaphthalene, see 498, Table B-2, Dye Intermediates					
308G DP	Nitrophenol (3 isomers) ($C_6H_5NO_3$)	(WNR XQ)	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Nitration (Benzoic acid, nitric acid, sulfuric acid)	329	**Air:** NO_x **Water:** Benzoic acid m-nitrobenzoic acid	—	—	See above item	1)766
Nitration (Propane, nitric acid, water, air)	237	**Air:** above plus CO, NO_x, propane **Water:** aldehydes, ketones, acids, alcohols, olefins	—	—	Propellant; solvent for nitrocellulose, cellulose acetate, cellulose acetopropionate, cellulose acetobutyrate, vinyl, alkyd, & many other resins, waxes, fats & dyestuffs; chemical synthesis	1)578 2)390 3)859 5)562 7)13-879
See nitroethane (Same as nitroethane plus oxygenated sulfur compound)	237	—	—	—	Explosives; propellants; fuels; solvents	1)578 2)538 3)863 5)562 7)13-879
Nitration (Phenol, nitric acid)	307	**Water:** dinitrophenols, trinitrophenols, oxalic acid, nitric acid, phenol, p-nitrophenol **Emission factors:** phenol - 2.0, NO_2 - 2.0 nitrophenol - 1.0	—	—	Synthesis of o-aminophenol & o-nitroanisole; dye intermediate	1)722 7)13-889 12)

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
308	Phenol, o-nitro	000088755 (WNR CQ)	2828 rat 1297 rat 2080 mus	Liver & kidney damage in experimental animals LDLo:100 mg/kg, ivn-dog	—	—
309 DP	Phenol, p-nitro	000100027 (WNR DQ)	350 rat 467 mus	Hyperthemia, methemoglobinemia & CNS depression LD50:75 mg/kg, ipr-mus LDLo:10 mg/kg, ivn-dog LDLo:65 mg/kg, ims-pgn	—	—
—	Phenol, m-nitro	00055487 (WNR BQ)	447 rat 1414 mus	High oral toxicity LDLo:83 mg/kg, ivn-dog	—	—
310G	Nitropropanes $CH_3CH_2CH_2NO_2$ $C_3H_7NO_2$)	—	—	—	—	—
310	Propane, 1-nitro	000108032 (WN3)	800 mus LDLo:250 rbt	LDLo:500 mg/kg, orl-hmn TCLo:150 ppm TFX:IRR, ihl-hmn	USOS air: TWA 25 ppm or 90 mg/m^3	—
311	Propane, 2-nitro	000079469 (WNY)	LDLo:500 rat LDLo:500 rbt	TDLo:20 ppm TFX:GIT, ihl-hmn Gastrointestinal disturbances & injury to kidneys & liver. Large doses produce methemoglobinemia & cyanosis LCLo:1513 ppm/ 5H, ihl-rat LDLo:75 mg/kg, ipr-mus LCLo:714 ppm/ 5H, ihl-cat LCLo:2381 ppm/ 5H, ihl-rbt	USOS air: TWA 25 ppm or 90 mg/m^3	—
—	p-Nitrochlorobenzene, see 104DP					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See above item	See above item	See above item	—	—	See above item	2)647 3)864
Ditto	Ditto	Ditto	—	—	87% manufacture ethyl & methyl parathions (insecticide); 13% other including synthetic dyes, n-acetyl-p-amino-phenol & leather treatments; production of phenetidines; indicator; fungicide; photochemicals	2)647 13)
—	—	—	—	—	Ditto	2)647 3)864
See Nitroethane	237	—	—	—	Solvent in the coating industry; printing inks; propellants; fuels; pesticides	1)578 2)964 3)972 7)13-879
Ditto	Ditto	—	—	—	Ditto	2)756 3)865 5)562
Ditto	Ditto	—	—	—	Ditto	Ditto

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
312G DP	Nitrotoluene (3 isomers) $CH_3C_6H_4NO_2$ ($C_7H_7NO_2$)	(WNR X)	—	—	—	—
312	Toluene, o-nitro	000088722 (WNR B)	891 rat 2462 mus	—	USOS air: TWA 5 ppm (skn) or 30 mg/m^3 (skn)	—
313	Toluene, p-nitro	000099990 (WNR D)	2144 rat 1231 mus	LD50:940 mg/kg, ipr-rat	USOS air: TWA 5 ppm (skn) or 30 mg/m^3 (skn)	—
314	Toluene, m-nitro	000099081 (WNR C)	1072 rat 330 mus 2400 rbt 3600 gpg	—	USOS air: TWA 5 ppm (skn) or 30 mg/m^3 (skn)	—
315	Nonene $C_7H_{14}\cdot CH{:}CH_2$ (C_9H_{18})	027215958 (8U1)	—	—	—	—
316 DP	Nonylphenol (Phenol, n-nonyl) $C_6H_4OHC_9H_{19}$ ($C_{15}H_{24}O$)	025154523 (QR X9)	1620 rat	LD50:2140 mg/kg, skn-rbt	—	—
317 DP	Octylphenol (Phenol, n-octyl) $C_6H_4(C_8H_{17})OH$ ($C_{14}H_{22}O$)	027193288 (QR X8)	—	LDLo:25 mg/kg, ipr-mus	—	—
318	Oxo alcohols	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Nitration (Toluene, nitric acid, sulfuric acid, sodium hydroxide)	338	**Water:** Soluble by-products, alkali or spent acid **Solids:** Heavy tar still bottoms	Still bottoms disposed (40 kg/1000 kg)	––	Organic synthesis; for production of toluidine, tolidine, fuchsin, & various synthetic dyes; explosives	1)782 2)915 3)869 7)13-849
Ditto	Ditto	––	––	––	Ditto	2)915 3)869 5)526
Ditto	Ditto	––	––	––	Ditto	Ditto
Ditto	Ditto	––	––	––	Ditto	Ditto
See dodecene	264	––	––	––	Organic synthesis; wetting agent; lube oil additive; polymer gasoline	1)640 2)596
Alkylation (Phenol, nonene, BF_3 catalyst)	311	**Water:** phenol, nonylphenol, boron salts **Emission factors:** phenol - 2.0 nonylphenol - 1.0	Product wash unit	49/1973	Manufacturing: 70% nonionic surfactant (nonbiodegradable), 15% plastic & rubber antioxidants, 10% lube oil additives, 5% miscellaneous; petroleum demulsifiers, fungicides; bactericides; dyes; drugs; adhesives; rubber chemicals; phenolic resins & plasticizers ore flotation	1)728 2)648 3)871 7)1-908 9)23 12) 13)42
Alkylation (Phenol, diisobutylene, H_2SO_4 catalyst)	312	**Water:** phenol, H_2SO_4, octylphenol **Emission factors:** phenol - 1.0 propylene - 1.0	Product wash unit	––	Nonionic surfactants; plasticizers; antioxidants; fuel oil stabilizer; intermediate for resins, fungicides, bactericides, dyestuffs, adhesives; rubber chemicals	1)730 2)648 3)876 12)
Reduction or dimerization (Aldehydes, phosphine promoted Co carbonyl catalyst, hydrogen, Ni	188	**Air:** Hydrocarbons **Water:** Flow - 1.59 m^3/454 kg COD - 1.21 kg/m^3 1.93 kg/454 kg BOD_5 - 0.9 kg/m^3 - 1.43 kg/454 kg	––	––	—	1)472

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
318 (Continued)						
319	Oxo aldehydes	--	--	--	--	--
320	Paraldehyde (s-Trioxane, 2,4,6-trimethyl) $OCH(CH_3)OCH(CH_3)OCHCH_3$ $(C_6H_{12}O_3)$	000123637 (T60 CO EOTJ B D F)	1530 rat 3304 rat	TDLo:14 mg/kg, TFX:PSY,orl-hmn TDLo:14 mg/kg, TFX:PSY, ivn-hmn TDLo:71 mg/kg, TFX:PSY, ims-hmn TDLo:14 mg/kg, TFX:PSY, rec/hmn Hypnotic & analgeric properties. Habit forming	--	TDLo:12 gm/kg/W, TFX:NEO, skn-mus
321	PEG chloride (Polyethylene glycol chloride) (Acetaldehyde, chloro-dimethylacetal) $ClC_2H_4OC_2H_4OH$ $(C_4H_9ClO_2)$	000097972	1070 rat	LD50:3180 mg/kg, skn-rbt	--	--
322	Pentaerythritol $C(CH_2OH)_4$ $(C_5H_{12}O_4)$	000115775 (Q1 4X)	25,500 mus 11,300 gpg	Low toxicity	10 mg/m^3	--
323	Pentane $CH_3(CH_2)_3CH_3$ (C_5H_{12})	000109660 (5H)	--	LCLo:130,000 ppm TFX:CNS, ihl-hmn Narcotic in high concen.	USOS air: TWA 1000 ppm	--

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
		TOC - 0.549 kg/m^3 0.87 kg/454 kg				
Oxo Process, Hydroformylation (Synthesis gas, olefin, Co carbonyl catalyst)	187	Air: olefin, synthesis gas	---	---	---	1)470
Polymerization (Acetaldehyde, sulfuric acid catalyst)	93	**Water:** acetaldehyde, sulfuric acid **Emission factors:** acetaldehyde - 10.0	---	---	Substitute for acetaldehyde; rubber accelerators; rubber antioxidants; synthetic organic chemicals; dyestuff intermediate; medicine; solvent for fats, oils, waxes, gums, resins, leather; solvent mixtures for cellulose derivatives	1)255 2)933 3)885 12)
Polymerization, Chlorination Ethylene oxide, ethylene chlorohydrin		---	---	---	---	2)736
See formic acid	94	**Emission factors:** Hydrocarbons - 30.0	---	46.8/1973 56.7/1974 45.2/1975 55/1978	Manufacturing: 70% alkyd resins, 13% rosin & tall oil esters, 7% jet engine lubricants, 3.5% PETN explosives; special varnishes; pharmaceuticals; plasticizers; insecticides; paint swelling agents; printing inks; floor coverings; adhesives; dietetic foods; surface-active agents; polyurethane foams; molded pipes; gears; electrical insulators	1)257 2)619 3)889 6)645 7)1-592 11)37 12)
See Butane	---	---	---	---	Automotive, aviation, form fuels; manufacture of ethylene & other olefins, solvent, blowing agent for foams; synthetic rubber	2)619 3)890 7)14-714

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
324G	Pentylenes (Amylene) (C_5H_{10})	025377724	—	—	—	—
325	1-Pentene (α-n-Amylene) $CH_3(CH_2)_2CH{:}CH_2$ (C_5H_{10})	000109671 (4U1)	—	Narcotic in high concen. Simple asphyxiant	—	—
326	2-Pentene (α-n-Amylene) $CH_3CH{:}CHCH_2CH_3$ (C_5H_{10})	000109682 (3U2)	Unknown	Unknown. Probably narcotic in high concen	—	—
327	Perchloroethylene (Ethylene, tetrachloro) CCl_2CCl_2 (C_2Cl_4)	000127184 (GYGUYGG)	8850 mus LDLo:4000 dog LDLo:4000 cat LDLo:5000 rbt	LDLo:500 mg/kg, orl-hmn TCLo:200 ppm, TFX:SYS, ihl-hmn TCLo:280 ppm/2H TFX:EYE, ihl-man TCLo:600 ppm/10M TFX:CNS, ihl-man Acute effects are to CNS. Also causes dermatitic, irr to GI tract LCLo:4000 ppm/4H, ihl-rat LDLo:85 mg/kg, ivn-dog LDLo:2200 mg/kg, scu-rbt	USOS air: TWA 100 ppm; or 670 mg/m^3 C: 200 ppm PK: 300 ppm/5M/3H	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
328	Perchloromethyl mercaptan (Methanethiol, trichloro) $ClSCCl_3$ (CCl_4S)	000075707 (SHXGGG)	83 rat	TCLo:45 ppm TFX:EYE, ihl-hmn LCLo:483 ppm/10M, ihl-hmn Highly toxic LCLo:58 ppm/10M, ihl-mus LCLo:58 ppm/15M, ihl-cat	USOS air: TWA 0.8 mg/m^3 or 0.1 ppm	TCLo:15 mg/m^3/68WI TFX:CAR, ihl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See Amyl alcohol	244	—	—	—	—	1)592
—	—	—	—	—	Organic synthesis; blending agent for high octane motor fuel	1)592 3)375
—	—	—	—	—	Polymerization inhibitor; organic synthesis	1)592 3)891
Chlorination of mixed hydrocarbons (Methane, ethane, ethylene, LPG, propane, ethylene dichloride, vinyl chloride process wastes)	235	Air: HCl and mixed chloro-hydrocarbons	Heavy distillation ends incinerated	321/1973 334/1974 306/1975 328/1978	75% dry cleaning solvent; 7% vapor-degreasing solvent; 8% intermediate, especially fluorocarbons; drying agent for metals & certain other solids; vermifuge; heat-transfer medium; rubber solutions; paint removers; printing ink; pharmaceuticals	1)573 2)422 3)892 5)563 11)37 13)43
See carbon tetrachloride	234	—	—	Ditto	Ditto	1)571
Ditto	140	—	—	Ditto	Ditto	1)364
See trichloroethylene	180	—	—	Ditto	Ditto	1)452
Chlorination (Carbon disulfide, chlorine, iodine catalyst)	165	Air: traces reactants sulfur	—	—	—	1)423 2)541 3)892 5)562

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
329G DP	o- and p-Phenetidine ($C_8H_{11}NO$)	(ZR X02)	—	High toxicity orl, ihl, skn, eye, mucous membrane. See Aniline.	—	—
329 DP	o-Phenetidine (2-Aminophenetole)	000094702 (ZR B02)	—	—	—	Carcingenic in man
330 DP	p-Phenetidine (4-Aminophenetole)	000156434 (ZR D02)	—	LD50:692 mg/kg, unk-mus	—	Ditto
331 DP	Phenol C_6H_5OH (C_6H_6O)	000108952 (QR)	TDLo:14 TFX: GIT orl-hmn 530 rat 414 rat 300 mus LDLo:420 rbt	LDLo:140 mg/kg, orl-hmn Effects CNS in acute poisoning. Death can result from abs through skn. Where death is delayed damage to the kidneys, liver, pancreas, spleen, & edema of lungs may occur LD50:669 mg/kg, skn-rat LD50:250 mg/kg, ipr-rat LDLo:650 mg/kg, scu-rat LD50:344 mg/kg, scu-mus LDLo:80 mg/kg, scu-cat LDLo:620 mg/kg, ipr-rbt LDLo:180 mg/kg, ivn-rbt	USOS air: TWA 5 ppm (skn) or 19 mg/m^3 (skn)	TDLo:4000 mg/kg/20WI TFX:CAR skn-mus
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ethylation & reduction (o,p-Nitrophenol, ethyl sulfate or ethyl chloride, sodium hydroxide, hydrochloric acid, iron filings, water)	308	Water: NaCl, ethyl chloride, ethyl alcohol, nitrophenol, phentidene isomers, by-products Air: ethyl chloride, ethyl alcohol, HCl	—	—	—	1)724 2)638 3)897 7)2-422
Ditto	Ditto	Ditto	—	—	Manufacture of dyes; laboratory reagent	3)1007
Ditto	Ditto	Ditto	—	—	Dyestuffs intermediate; pharmaceuticals; medicine; synthetic sweetner; rubber antioxidant	2)638 3)1008
See Acetone	37 & 295	—	—	1019/1973 1045/1974 783/1975 1239/1978	Manufacture: 49% phenolic resins, 14% bisphenol-A, 14% caprolactam, 4% methylated phenol, 3% plasticizers, 3% adipic acid, 2% salicyclic acid, 2% nonylphenol, 1% dodecylphenol, 3% other alkyl phenols, 1% 2,4-D, 1% pentachlorophenol, 2% chlorophenols, 1% petroleum refining, miscellaneous	2)638 3)897 4)810 5)562 7)15-158 11)37 13)43 6)647
See mixed cresols and o-cresol	78	—	—	Ditto	Ditto	—

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See above item	See above item	See above item	See above item	See above item	See above item
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
—	Phenols, higher methylated	—	—	—	—	—
332 DP	Phenolsulfonic acid (Benzenesulfonic acid, p-hydroxy) $C_6H_5SO_3H$ $(C_6H_6O_3S)$	(WSQR XQ) 003724138 (WSQR DQ)	—	Less toxic than phenol	—	—
333 DP	N-Phenyl anthranilic acid (Anthranilic acid, N-phenyl) $C_6H_5NH{\cdot}C_6H_4{\cdot}CO_2H$ $(C_{13}H_{11}NO_2)$	000091407 (QVR BMR)	—	—	—	—
334G DP	Phenylenediamines (3 isomers) $C_6H_4(NH_2)_2$ $(C_6H_8N_2)$	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (Benzoic acid, air, Mn promoted cupric benzoate catalyst)	326	**Water: kg/Mg** Acetone (1.8), Mn benzoate (5), Cu benzoate (2.1) **Solids: kg/Mg** Phenyl benzoate (1.5), tars (102)	Azeotrope separator, centrifuge	See item above	See item above	1)762
Substitution, Hydrolysis (Chlorobenzene, sodium hydroxide, diphenoloxide solvent)	8	**Water:** chlorobenzene, dichlorobenzene, chlorotoluene, phenol, benzene, diphyl ether	––	Ditto	Ditto	1)63
See m-cresol	82	––	––	––	––	––
Sulfonation (Phenol, sulfuric acid)	314	**Water:** sodium hydroxide	––	––	Water analysis; laboratory reagent; electroplated tin coatings baths; manufacture of intermediates & dyes; pharmaceuticals; nitrate analysis; drilling fluids; bleaching agent; plasticizer for concrete; printing; color inhibitor; ion-exchange resins; [illegible] tanning agent	1)733 3)898 7)15-212
––	––	––	––	––	––	––
––	––	––	––	29.1/1971	Azo dye intermediate; photo developing agent; fur dyes; photochemical measurements; intermediate in manufacture of antioxidants & accelerators for rubber; detection of nitrous acid; textile developing agent; organic synthesis; laboratory reagent	3)1013 5)562

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
334	m-Phenylenediamine	000108452 (ZR CZ)	LDLo:80 rat LDLo:300 cat LDLo:300 rbt	High orl, scu, ivn toxicity LDLo:30 or 80 mg/kg, scu-rat, see 2) & 3) LDLo:17 mg/kg, ivn-dog LDLo:200 mg/kg, scu-rbt	—	—
335	o-Phenylendiamine	000095545 (ZR BZ)	—	LDLo:50 mg/kg, orl-hmn Moderate toxicity LDLo:600 mg/kg, scu-rat LDLo:600 mg/kg, scu-mus	—	—
336	p-Phenylenediamine	000106503 (ZR DZ)	LDLo:100 rat LDLo:100 cat LDLo:250 rbt	LDLo:50 mg/kg, orl-hmn Skn irr. High toxicity orl, scu, ivn with death from liver damage. LDLo:50 mg/kg, ipr-rat LDLo:170 mg/kg, scu-rat LDLo:100 mg/kg, scu-dog LDLo:17 mg/kg, ivn-dog LDLo:200 mg/kg, scu-rbt	USOS air: TWA 0.1 mg/m^3 (skn)	—
337 DP	Phosgene $COCl_2$ (CCl_2O)	000075445 (GVG)	—	LC50:3200 mg/m^3, ihl-hmn TDLo:25 ppm/30M TFX:IRR, ihl-hmn Little warning properties. Where exposure is severe pulmonary edema occurs. Death may occur within 36 hours after exposure. LDLo:50 ppm/30M, ihl-rat LC50: 110 ppm/30M, ihl-mus LCLo:79 ppm/30M, ihl-dog	USOS air: TWA 0.1 ppm or 0.4 mg/m^3 0.05 ppm or 0.2 mg/m^3 (proposed 1974)	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction (m-Dinitrobenzene, iron, HCl)	27	**Water:** Iron, iron sulfides, ammonia, ammonium polysulfides	—	See item above	See item above	1)102 2)657 3)901
Substitution, Amination (o-Dichlorobenzene, Ammonia, Cu catalyst)	28	**Air:** NH_3 **Water:** Hydrochloric acid, copper chlorides	—	Ditto	Ditto	1)103 2)657 3)902
Reduction (p-Nitroaniline, hydrochloric acid, iron powder)	30	**Water:** Same as 27	—	Ditto	Ditto	1)107 2)657 3)902 5)562
Chlorination (Carbon monoxide, chlorine, NaOH, activated carbon catalyst)	189	**Water:** spent caustic	Scrubber	330.6/1973 394.3/1974	Manufacture: 62% toluene diisocyanates (TDI), 23% other isocyanates (MDI, PAPI, etc.), 6% polycarbonates, 9% miscaneous (pesticides, carbonates, & specialties); dye manufacture; aerial warfare; ore flotation; perfumes	1)475 2)660 3)908 5)562 6)648 7)15-680 9)205 12) 13)43

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
				LC50:1087 ppm/ 1M, ihl-mky LC50:1482 ppm/ 1M, ihl-cat LC50:141 ppm/ 30M, ihl-gpg		
--	Isophthalic acids, see 256					
--	Terephthalic acids, see 374					
338 DP	Phthalic anhydride $C_6H_4(CO)_2O$ $(C_8H_4O_3)$	000085449 (T56 BVOVJ)	4020 rat LDLo:100 gpg	Moderate orl toxicity	USOS air: TWA 2 ppm or 12 mg/m^3 TLV air: 1 ppm	--
	Ditto	Ditto	Ditto	Ditto	Ditto	--
339 DP	Phthalimide $C_6H_4(CO)_2NH$ $(C_8H_5NO_2)$	000085416 (T56 BVMMVJ)	Unknown	Unknown	--	--
340 DP	Phthalonitrile $C_6H_4(CN)_2$ $(C_8H_4N_2)$	000091156 (NCR BCN)	1860 rat 65 mus	LDLo:50 mg/kg, orl-hmn LD50:62 mg/kg, ipr-rat LD50:35 mg/kg, ipr-mus LD50:46 mg/kg, scu-mus	--	TDLo:1710 mg/kg/ 145 DI TFX:CAR, scu-rat TDLo:7 gm/kg/ 443 DI TFX:CAR, scu-mus TDLo:101 gm/kg/ 461 DI TFX:NEO, orl-rat TDLo:21 gm/kg/ 457 DI TFX:NEO, orl-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation (Naphthalene, air, V_2O_5 catalyst)	220	**Water: kg/Mg** maleic anhydride (42.7), phthalic amhydride (78.8), other (74.7)	Spray scrubber	465/1973 444/1974 322/1975 451/1978	Manufacture: 50% plasticizers, 19% alkyd resins, 24% polyesters; synthesis of phenolphthalein & other phthaleins, many other dyes; chlorinated products; pharmaceutical intermediate; insecticides	1)539 2)703 3)914 5)562 6)648 7)15-455 11)37 13)44
Oxidation (o-Xylene, air, V_2O_5 catalyst)	360	**Water:** 8-26 ppm formaldehyde, 1.7-2.5% maleic acid, COD+BOD approximately 2-6 kg/Mg	—		Ditto	1)830
Ammonolysis, Substitution (Phthalic anhydride, ammonia)	225	**Air or Water:** ammonia, phthalic anhydride	Ammonia absorber	—	Synthesis indigo, via anthranilic acid; fungicide; organic synthesis; laboratory reagent	1)651 2)704 3)914
Vapor ammonolysis & dehydration (Phthalic anhydride, ammonia)	222	**Air:** ammonia, phthalic anhydride, phthalonitril, phthalamide, phthalimide	—	—	Intermediate in organic synthesis, especially pigments & dyes; base material for high temperature lubricants & coatings; insecticides	1)544 2)705 3)568

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
341	β-Picoline (Pyridine, 3-methyl) $CH_3C_5H_4N$ (C_6H_7N)	(T6NJ B)	—	Unknown	—	—
342	Piperazine $NHCH_2CH_2NHCH_2CH_2$ $(C_4H_{10}N_2)$	000110850 (T6M DM DMTJ)	3800 rat	LDLo:5000 mg/kg, orl-hmn Excessive abs can cause urticaria, vomiting, diarrhea, blurred vision, weakness LD50:1100 mg/kg scu-mus	—	—
343	Polybutenes	(/*3U1*)	—	—	—	—
344	Polyethylene glycol $H(OCH_2CH_2)nOH$ $H(C_2H_4O)_nOH$	02322683 (/1*02*1/)	26,000 rat	LDLo:5000 mg/kg, orl-hmn	—	TDLo:420 gm/kg/Y TFX:CAR, ivg-mus (PEG 400)
345	Polyethylene glycol chloride $H(OCH_2CH_2)nCl$ $H(C_2H_4O)nCl$	—	1070 rat	LD50:3180 mg/kg, skn-rbt	—	—
346	Polypropylene glycol $HO(C_3H_6O)nH$ $(C_3H_8O_2)$	025322694 (/*0Y1*/)	419 rat 2150 rat	LDLo:500 mg/kg, orl-hmn	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Chichibabin synthesis (Acetaldehyde, ammonia, formaldehyde, methanol, silica-alumina catalyst)	100	**Air:** formaldehyde, ammonia, acetaldehyde, amine byproducts	——	——	Vitamins	1)270 3)915 13)44
Ammonolysis of Process 152 Amines (Ethanolamines, excess ammonia, Ni, Cu, Cr catalyst)	154	**Water:** ammonia, HCl, ammonium chloride, alcohol, ethylene dichloride, piperazine, sodium hydroxide **Air:** ammonia, others	——	—	Corrosion inhibitor; anthelmintic; insecticide; accelerator for curing polychloroprene & epoxy resins; textile water proofing	1)390 2)708 3)916 7)15-644
Polymerization (Butane/butylenes $AlCl_3$)	239	**Air:** C_4 hydrocarbons, dimers, trimers, etc., alcohols, ethers, alkylhalides	——	104.4/1967 84/1974	Hot-melt adhesives; sealing tapes; special sealants; cable insulation; polymer modifier; viscosity index improvers; lube oil additive	1)582 12)
See Diethylene glycol	155	—	—	25.8/1973 44.0/1974	Chemical intermediate (lower molecular weight varieties); plasticizers; softeners & humectants; lubricants; bases for cosmetics & pharmaceuticals; solvent; binders; metal & rubber processing; permissible additives to foods & animal feed; laboratory reagent; insecticides herbicides	1)392 2)736 3)921 7)10-657 9)204 12)
——	—	——	—	——	Solvent for cleaning, extracting, & dewaxing	2)736 3)921
Addition (Propylene oxide, propylene glycol, base catalyst)	288	**Water:** reactants and products, spent catalyst	Dehydrator	38.8/1973	Hydraulic fluids; rubber lubricants; antifoam agent; intermediate in urethane foams, adhesives, coatings, elastomers; plasticizers; paint formulations; laboratory reagent	1)686 2)737 3)922 9)204

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
347	Propane $CH_3CH_2CH_3$ (C_3H_8)	000074986 (3H)	—	Asphyxiant; at high concen has a CNS effect	USOS air: TWA 1000 ppm	—
—	Propene, 3-chloro, see 20					
—	Propene, 3-hydroxy, see 19					
—	2-Propanol, see 259					
348	Propionaldehyde CH_3CH_2CHO (C_3H_4O)	000123386 (VH2)	1400 rat LDLo:800 rat LDLo:800 mus	Moderate toxicity LCLo:8000 ppm/4H, ihl-rat LD50:820 mg/kg, scu-rat LD50:680 mg/kg, scu-mus LDLo:3400 mg/kg, skn-rbt	—	—
	Ditto	Ditto	Ditto	Ditto	—	—
349	Propionic acid CH_3CH_2COOH $(C_3H_6O_2)$	000079094 (QV2)	1510 rat 1370 mus 1900 rbg	Low toxicity based on animal studies LD50:625 mg/kg, ivn-mus LD50:500 mg/kg, skn-rbt	—	—
	Ditto	Ditto	Ditto	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See Butane	—	—	—	21,802/1971	Organic synthesis; household & industrial fuel; manufacture of ethylene, extractant; solvent; refrigerant; gas enrichener; aerosol propellant; mixture for bubble chambers; general purpose food additives	2)743 3)938 7)16-547
Oxidation, Dehydrogenation (n-Propyl alcohol, iron oxide or copper catalysts)	229	Air: hydrogen, n-propyl alcohol, propionaldehyde	—	—	Manufacturing of polyvinyl acetals & other plastics; synthesis of rubber chemicals; disinfectant; medicine; preservative; agriculture	1)564 2)766 3)941 4)873 7)16-551
See Allyl alcohol	251B	—	—	—	—	—
See acetic acid	227	**Emission factors:** acetone - 10.0, ethylene - 2.0, CO - 2.0	—	27.4/1973 39.5/1974	Cellulose propionates, other pripionates (e.g., Ca Na) some of which are used as mold inhibitor in bread & fungicides in general; herbicides; plasticizers & pharmaceuticals; emulsifying agents; solutions for electroplating nickel; perfume esters; artifical fruit flavors; solvent mixtures for cellulose derivatives	1)560 2)768 3)940 6)367 9)202 12) 13)44
Carbonylation (Ethylene, carbon monoxide, water, $NiCO_3/HBO_3$ catalyst)	126	—	—	Ditto	Ditto	1)330 7)16-556

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
350	n-Propyl alcohol $CH_3CH_2CH_2OH$ (C_3H_8O)	000071238 (Q3)	LDLo:5700 wmn 1870 rat LDLo:140 mus LDLo:3500 rbt	LDLo:500 mg/kg, orl-hmn LDLo:5700 mg/kg, orl-wmn LDLo:4000 ppm/4H, ihl-rat LD50:3230 mg/kg, scu-mus LDLo:5 mg/kg, scu-man	USOS air: TWA 200 ppm or 500 mg/m^3	—
351	n-Propylamine $CH_3CH_2CH_2NH_2$ (C_3H_9N)	000107108 (Z3)	LDLo:570 rat	Strong irr, skn sensitizer LC50:2310 ppm/4H, ihl-rat LD50:560 mg/kg, skn-rbt	USOS —	—
	Ditto	Ditto	Ditto	Ditto	—	—
352	n-Propyl chloride $CH_3CH_2CH_2Cl$ (C_3H_7Cl)	000540545 (G3)	—	Irr to mucous mem; narcotic in high concen	—	—
353	Propylene (Propene) (C_3H_6)	000115071 (2U1)	—	Simple asphyxiant. Skn burns from liquid form	—	—
354	Propylene chlorohydrin (1-Propanol, 2-chloro-) $CH_2ClCHOHCH_3$ (C_3H_7ClO)	000078897 (Q1YG)	220 rat 720 gpg	High toxicity LCLo:500 ppm/4H, ihl-rat LD50:480 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See butyl alcohol	227	**Emission factors:** propyl alcohol - 3.0, hydrocarbons - 2.0	—	42.1/1973 43.8/1974	Printing ink solvent; nail polish; lacquer; wood dyes; solvent plasticizer; metal degreaser; pesti-chemical intermediate	1)560 2)779 3)940 4)875 5)562 7)16-562 9)203 12)
Ammonolysis (n-Propyl alcohol, ammonia, activated alumina catalyst)	228	**Air or Water:** ammonia, n-propyl alcohol, propylamines	Stripper, separator	0.20/1973 1.6/1974	Intermediate; laboratory reagent; rubber chemical; dyestuffs; textile & leather finishing resins; pharmaceuticals; petroleum additives; agricultural chemicals; corrosion inhibitor	1)562 2)779 3)941 7)2-123 9)201 12)
Amination (n-Propyl chloride, ammonia)	231	**Air or Water:** ammonia, propyl chloride, propylamines	—	Ditto	Ditto	1)566
Substitution, chlorination (n-Propyl alcohol, hydrochloric acid, $ZnCl_2$ catalyst)	230	**Water:** zinc salts, propyl chloride, tars	—	—	Solvent; intermediate propylamine	1)565 2)743 3)942
—	—	—	—	4493/1973 4761/1974 3454/1975 6534/1978	Manufacture: 46-50% chemicals & 50-54% non-chemical; chemical: 11% polypropylene, 7.7% acrylonitrile, 6.7% isopropyl alcohol, 6.2% propylene oxide, 5.3% cumene, 4% oxo chemicals, miscellaneous; nonchemical: 34-37% gasoline alkylate, 6% polygas	2)764 3)942 6)650 7)16-591 9)37 13)44
Addition, Hydrochlorination (Propylene, chlorine, water)	285	**Air:** may contain bis (chloroisopropyl ether), ethylene, propylene, butane, HCl, Cl_2 **Water:** caustic soda, sodium chloride	—	—	Organic synthesis (introducing hydroxypropyl group); polyurethane foams; cosmetics; drugs & food	1)679 2)758 3)942 7)5-310

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
	See item above	See item above	See item above	See item above	—	—
355	Propylene dichloride (Propane, 1,2-dichloro) $CH_2ClCHClCH_3$ $(C_3H_6Cl_2)$	000078875 (GY1G)	1900 rat 860 mus LDLo:5000 dog	LDLo:50 mg/kg, orl-hmn Dermatitis. Liver, kidney & minor heart damage in animals exposed to high concen LCLo:2000 ppm/4H, ihl-rat	USOS air: TWA 75 ppm or 350 mg/m^3	—
—	Propylene glycol, see 293					
356	Propylene oxide (Propane, 1,2-epoxy) OCH_2CHCH_3 (C_3H_6O)	000075569 (T30TJ B)	930 rat 690 gpg	LCLo:400 ppm/4H, ihl-rat LC50:1740 ppm/4H, ihl-mus LCLo:2005 ppm/4H, ihl-dog LD50:1500 mg/kg, skn-rbt	USOS air: TWA 100 ppm or 240 mg/m^3	TDLo:1500 mg/kg/46WI TFX:NEO, scu-rat
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
357 DP	Pyridine NCHCHCHCHCH (C_5H_5N)	000110861 (T6NJ)	891 rat LDLo:4000 gpg	LDLo:500 mg/kg, orl-hmn Mild skn irr; CNS depressant LCLo:4000 ppm/4H, ihl-rat LD50:1000 mg/kg, scu-rat LDLo:1200 mg/kg, ipr-mus	USOS air: TWA 5 ppm or 15 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Hydration, Hydrolysis (Allyl chloride, sulfuric acid, water)	316	**Water:** sulfuric acid, allyl chloride, propylene chlorohydrin	—	—	See item above	1)736
See Propylene chlorohydrin, Process 285	322	—	—	—	Intermediate for perchloroethylene & carbon tetrachloride; lead scavenger for antiknock fluids; solvent for fats, oils, waxes, gums, & resins; solvent mixtures for cellulose esters & ethers; scouring compounds; spotting agent; metal degreasing agent; soil fumigant for nematodes	1)748 2)759 3)566 4)876 5)562
Elimination, Hydrolysis (Propylene chlorohydrin, calcium hydroxide)	286	**Air: kg/Mg** ethane (8.5), butane (8.5), propylene (8.5), Cl_2 (1.0), HCl (1.0), propylene oxide (4.1), **Water:** calcium chloride, calcium hydroxide, propylene glycol **Emission factors:** ethane, propane & propylene - 17.0, propylene oxide - 8.2	Caustic absorber	797/1973 798/1974 692/1975 929/1978	Manufacture: 56% polypropylene glycols & polyester glycols for polyurethanes, 29% propylene glycol, 5% dipropylene glycol, 5% surfacts, 5% glycol ethers & misc.; isopropanol amines; synthetic elastomer (homopolymer); food additive; lubes	1)681 2)755 3)944 5)562 6)651 7)16-606 11)37 12) 13)45
Epoxidation, Peroxidation (Propylene, isobutane, air, Mo catalyst)	320	**Air:** isobutane, butane, propylene, propylene oxide, ethylene oxide, acetaldehyde (quantities given)	—	—	Ditto	1)744
See β-Picolene		—	—	3.4/1968	Synthesis of piperidine, vitamins & drugs; solvent; waterproofing; rubber chemical; denaturant for alcohol & antifreeze mixtures; dyeing assistant in textiles; bactericides; fumgicides; herbicides	1)270 2)796 3)947 5)562 7)16-801

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
357 (Continued)				LD50:1121 mg/kg, skn-rbt LDLo:870 mg/kg, ipr-gpg		
—	Quinone, see 48					
358 DP	Resorcinol $C_6H_9(OH)_2$ $(C_6H_6O_2)$	000108463 (QR CQ)	301 rat	LDLo:29 mg/kg, orl-hmn Skn irr; systemic blood & nerve poison; in suitable solvent it can be absorbed through skn & cause local hyperemia, itching, dermatitis, edema, & corrosion associated with enlargement of lymph glands, methemoglobinemia, cyanosis, convulsions, tachycardia, syspnea & death LDLo:340 mg/kg, scu-mus LDLo:270 mg/kg, par-frg	—	TDLo:4800 mg/kg/ 12WI TFX:NEO, skn-mus
359 DP	Resorcylic acid (Benzoic acid, 2,4-dihydroxy-) $(HO)_2C_6H_3CO_2H$ $(C_7H_6O_4)$	027138574 (QVR BQ DQ)	—	—	—	—
360 DP	Salicylic acid HOC_6H_4COOH $(C_7H_6O_3)$	000069727 (QVR BQ)	891 rat LDLo:1300 rbt	LDLo:50 mg/kg, orl-hmn Nausea, dizziness, headache, confusion, sweating, rapid pulse & breathing, skn eruption; symptoms disappear when material is removed or dis discontinued LDLo:520 mg/kg, scu-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Substitution, Fusion (m-Benzenedisulfonic acid, sodium sulfite, sodium & calcium carbonate, sodium hydroxide, hydrochloric acid, ether)	23	Air: SO_x Water: Sludge Emission factors: hydrocarbons - 2.0 resorcinol - 1.0	---	11.8/1970	Manufacture: 43% tire & rubber products, 13% resorcinol-formaldehyde resins; dyes; pharmaceuticals; cross-linking agent for neoprene; rubber tackifier; adhesives for wood venteers & rubber-to-textile composites; medicine; manufacture of styphnic acid; analytical agent; explosion detonators; cosmetics; skn ointments; tanning agent; extraction of lubricating oil, ion exchange	1)93 2)842 3)955 7)11-478 12) 13)45
---	---	---	---	---	Dyestuff & pharmaceutical intermediate chemical intermediate in synthesis of fine organic chemicals; light stabilizers; resins	---
Carboxylation (Sodium phenate, CO_2, hydrochloric acid or sulfuric acid)	303A	Water: NaCL or sodium sulfate, hydrochloric acid or sulfuric acid, phenol, salicylic acid Emission factors: phenol - 1.0 H_2SO_4 - 0.1	---	6.2/1969 18.9/1973 19.9/1974	53% manufacture aspirin, other medicinals; preservative; dyes; perfumes; prevulcanization inhibitor; organic intermediate; fungicide; food additive for human consumption	1)714 2)848 3)962 7)17-726 9)24 12) 13)45

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
361 DP	Sodium acetate (Acetic acid, sodium salt) $NaC_2H_3O_2$ $(C_2H_3NaO_2)$	000127093 (OV1 &-NA-)	3530 rat 4960 mus	LD50:8000 mg/kg, scu-mus LD50:335 mg/kg, ivn-mus LDLo:3000 mg/kg, ivn-dog	—	—
362	Sodium benzoate (Benzoic acid, sodium salt) $NaC_7H_5O_2$ $(C_7H_5NaO_2)$	000532321 (OVR &-NA-)	4100 rat LDLo:2000 rbt	Large doses by mouth cause nausea & vomiting. Small doses have no effect LDLo:2000 mg/kg, scu-rbt LDLo:1400 mg/kg, ipr-gpg LDLo:1000 mg/kg, scu-frg	—	—
363	Sodium carboxymethyl cellulose (Cellulose, carboxymethyl ether, sodium salt) $(C_6H_{10}O_5)_xCH_2COONa$	009004426	27,000 rat	LD50:46,000 orl-gpg	—	TDLo:8600 mg/kg/19WI TFX: NEO, scu-rat
364	Sodium chloroacetate (Acetic acid, chloro-sodium salt) $ClCH_2COONa$ $(C_2H_2ClNaO_2)$	003926623 (QV1G & -NA-)	76 rat 165 mus 80 gpg	LD50:109 mg/kg, ivn-mus	—	—
365 DP	Sodium formate (Formic acid, sodium salt) HCOONa $(CHNaO_2)$	000141537 VHQ &-NA-)	11,200 mus LDLo:4000 dog	LD50:807 mg/kg, ivn-mus LDLo:3000 mg/kg, ivn-dog	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Neutralization (Acetic acid, sodium hydroxide)	106	**Water:** acetic acid, sodium hydroxide **Air:** acetic acid	Separator	—	Dye & color intermediate; pharmaceutical cinnamic acid; soaps; photo; purification of glucose; meat preservation; medicine; electroplating; tanning; dehydrating agent; buffer in foods; laboratory reagent	1)287 2)32 3)975
Salt Formation, Neutralization (Benzoic acid, sodium hydroxide, charcoal or potassium permanganate)	331	**Water:** benzoic acid, sodium hydroxide, sodium benzoate	—	5.4/1973	Fungicide; bactericide; food preservative; corrosion inhibitor; alkyd resin; plasticizers; dyes	1)770 2)196 3)976 7)3-428 9)199
Addition (Cellulose, sodium hydroxide, sodium chloroacetate, methanol or ethanol)	112	**Water:** sodium hydroxide, alkali cellulose, sodium chloroacetate, chloroacetic acid, sodium glycolate, methanol or ethanol	—	29.5/1970 31.1/1973	Textile manufacturing (sizing); detergents; soaps, food products (especially dietetic foods & ice cream), where it acts as water binder, thickener, suspending agent, & emulsion stabilizer; dentifrices; coating paper & paper board to lower porosity; drilling muds; emulsion paints; protective colloid; pharmaceutical; cosmetics; textiles	1)297 2)287 3)978 7)4-645 9)200
Neutralization (Chloroacetic and sodium carbonate, iron, H_2DO_4 or PCl_3)	109	**Water:** Cl_2, $FeCl_3$, HCl, CO_2	—	—	—	1)292 2)18 3)979
Addition, Fusion (Synthesis gas, sodium hydroxide)	190	**Air:** CO **Water:** sodium hydroxide	—	17.5/1973	Reducing agent; medicine; manufacture of formic acid & oxalic acid; organic chemicals; mordant; tanning; wallpaper print; plating	1)477 2)431 3)982 9)202

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
366	Sodium phenate (Sodium phenoxide) $NaOC_6H_5$ (C_6H_6NaO)	000139026 (QR &-NA-)	—	High toxicity, powerful irr, see Phenol	—	—
367	Sorbic acid (2,4-Hexadienoic) $CH_3(CH)_4COOH$ ($C_6H_8O_2$)	000110441 (QV1U2U2)	11,000 rat	LDLo:500 unk-hmn	—	TDLo:2600 mg/kg/65W TFX:CAR, scu-rat
368	Styrene (Phenyl ethylene) $C_6H_5CHCH_2$ (C_8H_8)	000100425 (1U1R)	5000 rat 316 mus	LDLo:500 mg/kg, orl-hmn LCLo:10,000 ppm/30M, ihl-hmn TCLo:600 ppm TFX:IRR, ihl-hmn TCLo:376 ppm TFX:CNS, ihl-hmn TCLo:20 mg/m^3 TFX:GLN, ihl-wmn LCLo:5000 ppm, ihl-rat LCLo:10,000 ppm, ihl-mus LCLo:12 gm/m^3/14H, ihl-gpg	USOS air: TWA 100 ppm or 420 mg/m^3 CL:200 ppm PK:600 ppm/5M/3H	—
369 DP	Succinic acid $COOH(CH_2)_2COOH$ ($C_6H_6O_4$)	000110156 (QV2VQ)	—	LDLo:2000 mg/kg, scu-frg	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Salt formation (Phenol, sodium hydroxide)	301	Air: phenol	—	—	Antiseptic; salicylic acid; organic synthesis	1)711 3)987
Condensation (Crotonaldehyde, ketene, zinc carboxylate catalyst)	96	Air: crotonaldehyde, sorbic acid **Water:** reactants and products, catalyst residue	—	—	Fungicide; food preservative; copolymerization; upgrading of drying oils; cold rubber additive; intermediate for plasticizers & lubricants; cosmetics; tobacco	1)262 2)862 3)992 7)18-592
Dehydrogenation (Ethylbenzene, SiO_2-Al_2O_3 catalysts)	3	**Emission factors:** hydrocarbons - 1.64, NO_2 - 0.05, particulate - 0.04 **Water:** tarry matter (13 kg/Mg total) containing styrene trimer, stilbene, biphenyl, napathalene, phenanthrene, ethylphenanthrene, others Plant 1: Flow - 0.0235 m^3/kg COD - 219 mg/l 5.13 g/kg BOD_5 - 69 mg/l 1.62 g/kg TOC - 22 mg/l 0.53 g/kg Plant 2: Flow - 0.00548 m^3/kg COD - 426 mg/l 2.34 g/kg BOD_5 - 70 mg/l 0.381 g/kg TOC - 22 mg/l 0.12 g/kg	—	2716/1973 2708/1974 1999/1975 3126/1978	Manufacture: 25% general purpose polystyrenes, 23% high impact polystyrene, 15% SBR, 6% ABS resins, 5% styrenated polyesters, 5% emulsion polymers; 4% SAN, 3% styrene-butadiene copolymer resins, misc.; intermediate; foamed plastics	1)52 2)875 3)902 5)562 6)653 7)19-73 11)37 12) 13)45
Hydrogenation (Maleic anhydride, hydrogen, Raney Ni catalyst)	39	**Water and Air:** Maleic anhydride and some catalyst	—	—	Medicine; organic synthesis; manufacture of lacquers, dyes, esters for perfumes, succinates; photo; in foods as a sequestrant, buffer, neutralizing agent; adhesives; coatings; elastomers; lubricants; pesticides; pharmaceuticals; paper; surface active agent; fibers & textiles	1)128 2)876 3)998 7)19-145

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
370	Succinonitrile $CN(CH_2)_2CN$ $(C_4H_4N_2)$	000110612 (NC2CN)	—	Highly toxic LD50:100 mg/kg, ipr-rat LDLo:150 mg/kg, unk-dog LDLo:36 mg/kg, unk-rbt LDLo:2200 mg/kg, unk-pgn LDLo:1000 mg/kg, scu-frg	—	—
371G 371	Sulfanilic acid (p-Aminobenzenesulfonic acid) $NH_2C_6H_4SO_3H \cdot H_2O$ $(C_6H_7NO_3S)$	(ZR XSWQ) (ZR DSWQ)	—	Unknown. Animal studies indicate low toxicity & slight irr	—	—
372	Sulfolane (Thiophene, tetrahydro-, 1,1-dioxide) $C_4H_8O_2S$	000126330 (T5SWTJ)	1540 rat 1900 mus	LCLo:4700 mg/m^3, ihl-rat LD50:3180 mg/kg, skn-rbt LD50:1080 mg/kg, ivn-mus	—	—
373	Synthesis gas	—	—	—	—	—
	Ditto	—	—	—	—	—
374 DP	Terephthalic acid $C_6H_4(COOH)_2$	000100210 (QVR DVQ)	—	LD50:1430 mg/kg, ipr-mus LDLo:767 mg/kg, ivn-dog	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Substitution (Acrylonitrile HCN, benzyltrimethylammonium hydroxide catalyst, t-butyl alcohol solvent)	275	**Water:** alcohol, ethylene dibromide, potassium cyanide, bromine, ethylene cyanide	—	—	Organic synthesis	1)662 2)878 3)998
Sulfonation (Aniline, sulfuric acid, caustic soda)	35	**Air:** SO_2, aniline **Water:** Caustic soda	—	—	—	1)118 3)999
Addition & hydrogenation, sulfonation or hydrogenation (Butadiene, SO_2, H_2, Cr, K, Al oxide catalysts, Cr-steel reactor)	60	**Air:** SO_2 **Water:** Ni, catalyst, polymeric by-products	—	—	Extraction of aromatic hydrocarbons from oil refinery streams; fractionation of wood tars, tall oil, & other fatty acids; polymerization solvent; plasticizer; component of hydraulic fluid; textile finishing; dielectrics	1)174 2)906 3)1000 7)19-251
Steam reforming (Natural gas, steam, NiO_2)	181	**Air:** H_2S, SO_2. ammonia	—	—	Organic synthesis; manufacture of alcohols (Oxo process); low-Btu fuel gas	1)454
Steam reforming (Natural gas, steam, oxygen, Ni catalyst)	182	—	—	—	Ditto	1)458 3)1010
Oxidation (After 1975 - only air oxid. in acetic acid solvent) (p-Xylene, nitric acid, oxygen, acetic acid, catalyst)	362A	**Air:** NO_x (6.5 kg/Mg), particulantes (0.9 kg/Mg) **Water:** Flow - 3.62×10^{-4}, -9.09×10^{-3} m/kg COD - 5,400 - 24,950 g/m^3 BOD^5 - 3,600 - 7,500 g/m^3 TOC - 4,200 - 3,730 g/m^3 **Emission factors:** Xylene - 2.0, hydrocarbons - 2.0	—	Combined total for diacid and dimethyl ester 1937/1974 2114/1975 2714/1978	Manufacturing: polyethyleneterephthalate-88% fiber & 7% film; 5% export; polyesters with other glycols (e.g., 1,4-butanediol) growing; also used as a reagent for alkali in wool; additive to poultry feeds; intermediate in herbicide; adhesives; printing inks; coating & paints	2)888 3)1016 7)15-472 11)36 12) 13)47

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	Also dimethyl ester (DMT), dimethyl terephthalate	(1OVR DV01)	—	Unknown	—	—
—	See phthalic acids, 334					
375 DP	Tetrachloroethane (Ethane, 1,1,2,2-tetrachloro-) (Acetylene tetrachloride) $CHCl_2CHCl_2$ $(C_2H_2Cl_4)$	001299907 (GYGYGG)	200 rat	LDLo:50 mg/kg, orl-hmn TDLo:30 mg/kg, TFX:CNS Generally considered the most toxic common chlorinated hydrocarbon; produces acute liver conditions - yellow atrophy & cirrhosis; fatty degeneration of kidneys & heart, lung & serious membrane hemorrhage & brain edema observed in hmn fatilities. LCLo:1000 ppm/4H, ihl-rat LD50:3990 mg/kg, skn-rbt	—	—
376 DP	Tetrachlorophthalic anhydride $C_6Cl_4C_2O_3$ $(C_8Cl_4O_3)$	000117088 (T56 BVOVJ-/G 4)	—	—	—	—
377	Tetraethyl lead (Plumbane, tetraethyl) $Pb(C_2H_5)_4$ $(C_8H_{20}Pb)$	000078002 (2-PB-2&2&2)	LDLo:17 rat	Powerful poison LC50:6 ppm, ihl-rat LC50:850 mg/m^3/60 M, ihl-rat LDLo:10 mg/kg, ipr-rat LDLo:31 mg/kg, ivn-rat LD50:15 mg/kg, par-rat LDLo:500 mg/kg, skn-dog	USOS air: TWA 0.117 mg/m^3 (skn)	LDLo:86 mg/kg/21DI TFX:CAR, scu-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Esterification (Terephthalic acid, methanol)	—	**Emission factors:** hydrocarbons - 63.4, CO - 36.7, particulate - 0.9, SO_2 - 0.7, NO_2 - 0.06	—	See item above	See item above	See item above
Chlorination (Acetylene, chlorine, antimony trichloride catalyst)	179	**Air: kg/Mg** ethane (1.25), methane (1.25), tetrachloroethane (0.50) **Water:** salts, tetrachloroethane **Air:** CO_2, ammonia, acetic acid, terephthalic acid	—	—	Intermediate manufacture trichloroethylene, & s-dichloroethylene; one of the most important "captive" industrial organic chemicals solvent used in organic synthesis	1)450 2)390 3)338 7)5-163
Chlorination (Phthalic anhydride, chlorine, sulfuric acid, $SbCl_5$ catalyst)	221	**Water:** phthalic anhydride, sodium hydroxide, various chloro-substituted phthalic anhydride	Acid scrubber	—	Intermediate in dyes, pharmaceuticals, plasticizers, & other organic materials; flame-retardant in epoxy resins	1)543
Addition (Ethyl chloride, lead amalgam)	116	**Air:** butene, ethane, ethylene **Water:** tetraethyl lead, hydrogen peroxide, & sodium dichromate **Solids:** lead sludge **Emission factors:** ethyl chloride - 4.0, methyl chloride - 1.0, ethylene dichloride - 1.0, ethylene dibromide - 1.0	—	160.4/1973 211/1974	100% antiknock gasoline additive; certain ethylation operations	1)305 2)734 3)770 5)562 6)638 9)205 12) 13)46

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
	See above item	See above item	See above item	See above item	See above item	See above item
378	Tetrahydronaphthalene (Naphthalene, 1,2,3,4-tetrahydro) (Tetralin) ($C_{10}H_{12}$)	000119642 (L66&TJ)	2860 rat	Irr; narcotic; cateracts & kidney injury LCLo:275 ppm/8H/17D, ihl-gpg	––	––
379	Tetrahydrophthalic anhydride (4-Cyclohexene-1,2-dicarboxylic anhydride) ($C_8H_8O_3$)	000085438 (T56 BVOV GUTJ)	LDLo:4590 rat	LDLo:500 mg/kg, ipr-mus	––	––
380	Tetramethylenediamine (1,4-Butanediamine) $NH_2(CH_2)_4NH_2$ ($C_4H_{12}N_2$)	000110601 (Z4Z)	LDLo:1600 rbt	LDLo:80 mg/kg, ivn-rbt LDLo:300 mg/kg, scu-rat	––	––
381	Tetramethylethylenediamine (Ethylenediamine, N,N,N^1,N^1-tetramethyl) $(CH_3)_2NH_2CCNH_2(CH_3)_2$ ($C_6H_{16}N_2$)	000110189 (1N1&2N1 &1)	LDLo:1580 rat	Moderate orl & skn toxicity	––	––
382 DP	Toluene-2,4-diamine (2,4-Diaminotoluene) $CH_3C_6H_3(NH_2)_2$ ($C_7H_{10}N_2$)	000095807 (ZR CZ D)	LDLo:500 rat	LDLo:50 mg/kg, orl-hmn Liver damage; skn irr LDLo:50 mg/kg, unk-rat LDLo:200 mg/kg, scu-dog LDLo:350 mg/kg, unk-dog LDLo:400 mg/kg, unk-rbt LDLo:200 mg/kg, unk-gpg	––	TDLo:11 gm/kg/36WC, TFX:CAR, orl-rat
––	Toluene-2,4-diisocyanate, see 83ADD					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Electrolysis (Ethyl chloride, magnesium, lead, tetrahydrofuran or diethyleneglycol dibutyl ether)	117	—	—	See above item	See above item	1)307
Hydrogenation (Haphthalene, hydrogen, Ni catalysts)	215	**Air:** hydrogen, naphthalene, tetrahydronaphthalene	—	—	Solvent; chemical intermediate	1)529 2)579 3)1017 7)13-687
Diels-Alder reaction (1,3-butadiene, maleic anhydride, benzene)	40	**Air:** benzene	—	—	Chemical intermediate for light colored alkyds, polyesters, plasticizers & adhesives; intermediate for pesticides; hardener for resins	1)130 2)329 3)1017
—	—	—	—	—	Chemical intermediate	—
Alkylation (Ethylenediamine, methyl chloride, ethanol or butanol)	—	**Air:** methyl chloride, solvent **Water:** sodium hydroxide	—	—	—	2)420 3)1019
Reduction (Dinitrotoluene, hydrogen)	343	**Water:** toluidine (11 gm/kg), toluenediamine (9.8 gm/kg)	—	87.6/1973	Dye intermediate; direct oxidation black for furs & hair; source for toluene-2,4-diisocyanate	1)791 2)914 3)1035

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
383	p-Toluene sulfonamide $CH_3C_6H_4SO_2NH_2$ $(C_7H_9NO_2S)$	000070553 (ZSWR D)	75 bdw	High orl & ipr toxicity LD50:250 mg/kg, ipr-mus	—	—
384G DP	Toluenesulfonic acids (3 isomers) $CH_3C_6H_4SO_3H$ $(C_7H_8O_3S)$	025231463 (WSQR X)	—	—	—	—
384	p-Toluenesulfonic acid	000104154 (WSQR D)	400 mus 2480 rat	Details unknown, Animal experiments show moderate systemic toxicity & high irritation	—	—
385 DP	p-Toluenesulfonyl chloride $CH_3C_6H_4SO_2Cl$ $(C_7H_7ClO_2S)$	026763713 (WSGR D)	—	—	—	—
386G DP	Toluidines (3 isomers) $CH_3C_6H_4NH_2$ (C_7H_9N)	— (ZR X)	—	Severe systemic disturbance, headache, weakness, breathing difficulty, air-hunger, psychic disturbances, bladder & kidney irr	—	—
386	m-Toluidine	000108441 (ZR C)	974 rat	LD50:150 mg/kg, ipr-mus	—	TDLo:6.6 mg/kg/19WI TFX:NEO, orl-rat
387	o-Toluidine	000095534 (ZR B)	900 rat LDLo:300 cat LDLo:5 frg	LD50:150 mg/kg, ipr-mus LD50:3250 mg/kg, skn-rbt	USOS air: TWA 5 ppm (skn)	TDLo:8200 mg/kg/24WI TFX: NEO, orl-rat TDLo:870 mg/kg/78WC TFX:NEO
388	p-Toluidine	000106490 (ZR D)	656 rat LD50:42 bdw	LDLo:50 mg/kg, orl-hmn LD50:50 mg/kg, ipr-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Ammonolysis, Amination (Ammonia, toluene-sulfonyl chloride	358	**Air:** HC1, NH_3 **Water:** ammonium chloride, product	—	—	Organic synthesis; plasticizers & resins; fungicide & mildewcide in paints & coatings	1)821 2)915 3)1036
Sulfonation (Toluene, oleum)	79	**Air:** toluene **Water:** sodium sulfate, toluene, toluene sulfonic acid **Emission factors:** toluene - 1.0	Scrubber	—	Dyes; organic synthesis; acid catalyst	1)211 12)
Ditto	Ditto	Ditto	Ditto	—	Ditto	2)916 3)1036
Sulfonation & substitution, condensation (toluene, oleum, PCl_3)	357	**Air:** HCl **Water:** sulfuric acid, hydrochloric acid, chlorine	—	—	Organic synthesis; intermediate in the systhesis of saccharin & dyestuffs	1)819
Reduction (Nitrotolulene, hydrochloric acid-iron, or hydrogen, catalyst)	341	**Water:** toluidine hydrochloride **Air:** particulates, HCl	—	—	Dyes	1)787 3)1036 7)2-421
Ditto	Ditto	Ditto	—	—	Ditto	3)1036 2)917
Ditto	Ditto	Ditto	—	—	Ditto	2)917 3)1036
Ditto	Ditto	Ditto	—	—	Ditto	2)917 3)1036 7)2-421

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
389	Trichloroaniline $Cl_3C_6H_2NH_2$ ($C_6H_4Cl_3N$)	—	—	—	—	—
390G DP	Trichlorobenzenes (3 isomers)	(GR XG XG)				
390	1,2,4-Trichlorobenzene	000120821 (GR BG DG)	756 rat 766 mus	Liver injury; chronic local; causes loss of hair in experimental animals 1,2,3- and 1,3,5-isomers have similar toxicity	Air: 5 ppm	—
391	1,1,2-Trichloroethane, 1,1,2-trichloro) $ClCH_2CHCl_2$ ($C_2H_3Cl_3$)	000079005 (GYGIG)	1140 rat LDLo:500 dog	LDLo:50 mg/kg, orl-hmn Narcotic; irr to eyes, nose & lungs; injurious to liver & kidneys LCLo:500 ppm/8H, ihl-rat LD50:227 mg/kg, scu-mus LDLo:95 mg/kg, ivn-dog LDLo:500 mg/kg, scu-rbt	USOS air: TWA 10 ppm (skn)	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
392	Trichloroethylene (Ethylene, trichloro) $CHClCCl_2$ (C_2HCl_3)	000079016 (GYGV1G)	4920 rat LDLo:5860 dog	LDLo:50 mg/kg, orl-hmn LDLo:857 mg/kg, orl-hmn TCLo:6900 mg/m^3/10M, TFX:CNS, ihl-hmn TCLo:160 ppm/83M TFX:CNS, ihl-hmn TCLo:110 ppm/8H, ihl-man Narcotic & anesthetic in high concen. Additive. Fatalities due to heart failure	USOS air: TWA 100 ppm or 535 mg/m^3 C: 200 ppm PK: 300 ppm/5M/2H REC STD air TWA: 100 ppm C: 150 ppm	TDLo:351 gm/kg/78WI TFX:CAR, orl-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Chlorination (Aniline, HCl, CCl_4 or EtOH solvent)	19	**Air and Water:** CCl_4, EtOH, Cl_2, HCl, aniline	—	—	—	1)83
Chlorination (Dichlorobenzene, chlorine, $FeCl_3$)	6	**Water:** traces di-, tri-, and polychlorinated benzenes	—	12.9/1973	Solvent in chemical manufacturing; dyes & intermediate; dielectric fluid; synthetic transformer oils; lubricants; heat-transfer medium; insecticide, coolant	1)59 2)166 3)1043 7)5-265 9)24
Chlorination (Ethylene dichloride, chlorine)	137	**Water:** chlorine, HCl, sodium hydroxide, ethylene dichloride, trichloroethane, **Air:** HCl, organic chlorides **Emission factors:** hydrocarbons - 5.0 CO - -.1	HCl scrubber	170.1/1971 193.0/1974	Manufacture of vinylidene chloride; solvent for cleaning precision instruments; aerosol prcpellant; metal degreasing; pesticide; solvent for fats, oils, waxes, resins, other products; organic synthesis	1)359 2)398 3)1044 6)656 7)5-159 12)
Oxychlorination (Ethylene dichloride, hydrogen chloride, oxygen)	138	Ditto	—	—	Ditto	1)361 6)656
See carbon tetrachloride	140	**Emission factors:** trichloroethylene - 57.0, CCl_4 - 26.0, dichloroethane - 26.0, tetrachloroethane - 0.1	—	205/1973 176/1974	90% metal cleaning; 10% extraction, solvent, export; used for degreasing & dry cleaning; extraction solvent for oils, fats, waxes; solvent dyeing; refrigerant & heat exchange liquid; organic synthesis; fumigant; cleaning & drying electronic parts; manufacturing food additives for human consumption	1)364 2)422 3)1045 5)563 7)5-193 9)205 12) 13)46

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
392 (Continued)				LCLo:8000 ppm/4H, ihl-rat LCLo:3000 ppm/2H, ihl-mus LD50:34 mg/kg, ivn-mus LD50:1900 mg/kg, ipr-dog LDLo:150 mg/kg, ivn-dog		
	See above item	See above item	See above item	See above item	See above item	See above item
	Ditto	Ditto	Ditto	Ditto	Ditto	Ditto
393	Trichlorofluoromethane (Methane, trichlorofluoro) (Freon 11) $FCCl_3$ (CCl_3F)	000075694 (GXGGF)	--	Anesthesia LDLo:100,000 ppm/20M, ihl-rat	USOS air: TWA 1000 ppm or 5600 mg/m^3	--
394	1,2,3-Trichloropropane (Propane, 1,2,3-trichloro) $CH_2ClCHClCH_2Cl$ $(C_3H_5Cl_3)$	000096184 (G1YG1G)	320 rat LDLo:200 dot	Cumulative toxicity LCLo:1000 ppm/4H, ihl-rat LD50:1770 mg/kg, skn-rbt	USOS air: TWA 50 ppm or 300 mg/m^3	--
395	1,1,2-Trichloro-1,2,2-Trifluoroethane (Ethane, 1,1,2-trichloro-1,2,2-trifluoro) (Freon 113) CCl_3CF_3 $(C_2Cl_3F_3)$	000076131 (GXGFX TFF)	LDLo:45 rat	TCLo:4500 ppm TFX:CNS, ihl-hmn LCLo:87,000 ppm/6H ihl-rat	USOS air: TWA 1000 ppm or 7600 mg/m^3	--
396	Triethanolamine (Ethanol, 2,2',2''-nitrilotris) $(CH_2OHCH_2)_3N$ $(C_6H_{15}NO_3)$	000102716 (Q2N2Q2Q)	8000 gpg 8680 rat	LDLo:5000 mg/kg, orl-hmn Kidney & liver damage in animals under chronic exposure	--	--

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See perchloro-ethylene	180	— —	— —	— —	See above item	1)452
Ditto	235	— —	— —	— —	Ditto	1)573
See dichloro-difluoromethane	163	— —	— —	152/1973 156.2/1974	50% aerosol propellants, 28% refrigerants, 10% plastics, 5% solvent, 7% blowing agent, export & miscellaneous	1)417 2)542 3)693 6)631B 9)205 13)47
Chlorination (Propylene, chlorine, propylene dichloride)	321	**Air:** HCl, chlorine, chlorinated hydrocarbons **Water:** sodium hydroxide, chlorine, NaCl, hydrochloric acid	— —	— —	Paint & varnish remover; solvent; degreasing agent	1)747 2)757 3)1047 5)562
Fluorochlorination (Perchloroethylene, hydrogen fluoride, chlorine, partially fluorinated $SbCl_5$ or $ZrCl_2$ catalyst)	141	**Air & Water:** chlorofluorocarbons **Water:** sodium hydroxide, hydrochloric acid **Emission factors:** HCl - 2.0, freon - 1.0	Scrubber	— —	Dry cleaning solvent; fire extinguishers; refrigerant; air-conditioning units; to make chlorotrifluoroethylene; blowing agent; polymer intermediate; solvent drying; drying electronic parts & precision equipment	1)367 2)399 5)562 12)
See diethanolamine	149	— —	— —	44.8/1973 49/1974	Fatty acid soaps used in drycleaning, cosmetics, household detergents, & emulsions; wool scouring; textile antifume agent & water-repellant; dispersion agent; corrosion inhibitor; softening agent; humectant, & plasticizer; insecticide; chelating agent; rubber accelerator	1)369 2)408 3)1049 6)622 9)201

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
397	Triethylamine $(C_2H_5)_3N$ $(C_6H_{15}N)$	000121448 (2N2&2)	460 rat 546 mus	Kidney & liver damage in experimental animals LCLo:1000 ppm/4H, ihl-rat LD50:570 mg/kg, skn-rbt LCLo:1000 ppm/4H, ihl-gpg	USOS air: TWA 25 ppm or 100 mg/m^3	––
398	Triethylene glycol $(CH_2OCH_2CH_2OH)_2$ $(C_6H_{14}O_4)$	000112276 (Q2O2oQ)	18,500 mus 17,000 rat	LDLo:5000 mg/kg, orl-hmn 9739 scu-mus LD50:8750 mg/kg, scu-mus LD50:6500 mg/kg, ivn-mus	––	––
399	Triethylene glycol dimethyl ether $CH_3(OCH_2CH_2)_3OCH_3$ $(C_8H_{18}O_4)$	000112402 (102020201)	––	See glycol ethers	––	––
400	Triisobutylene (1-Propene, 2-methyl-,) $(CH_3)_2C{:}C[C(CH_3)_3O_2]$ $(C_{12}H_{24})$	007756947 (1N1&1)	––	––	––	––
401	Trimethylamine (Methanamine,n,n-dimethyl) $(CH_3)_3N$ (C_3H_9N)	000075503 (1N1 & 1)	––	LDLo:75 mg/kg, ipr-mus LD50:90 mg/kg, ivn-mus LDLo:1000 mg/kg, scu-mus LDLo:800 mg/kg, scu-rbt LDLo:400 mg/kg, ivn-rbt	––	––
402	Urea (Carbamide) $(NH_2)_2CO$ N_2H_4DO (CH_4N_2O)	000057136 (ZVZ)	LDLo:511 dom	Moderate toxicity LDLo:3000 mg/kg, scu-dog LDLo:3000 mg/kg, ivn-dog LDLo:3000 mg/kg, scu-rbt LDLo:600 mg/kg, scu-frg	––	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See diethylamine	120	**Emission factors:** hydrocarbons - 2.0, NH_3 - 1.0	––	13.0/1974	Catalytic solvent in chemical synthesis; accelerator activators for rubber; wetting; penetrating & water proofing agent of quarternary ammonium types; curing & hardening of polymers (e.g., core-binding resins); corrosion inhibitor propellant; print remover	1)316 2)931 3)1050 5)562 7)2-123 12)
See diethylene glycol	144	––	––	51.3/1973 50.2/1974	30% natural gas dehydration, 17% humectant, 15% printing ink, 12% vinyl plasticizers, 8% polyester & polyurethane resins, 12% Udex extraction solvent	1)374 2)932 3)1051 6)628 9)204 12) 13)47
See diethylene glycol dibutyl ether	150	––	––	––	Solvent for gases; coupling immiscible liquids	1)384 3)1052
See diisobutylene	75	––	––	––	Synthesis of resins, & industrial organic compounds; lubricating oil additive, raw material for alkylation in producing high octane motor fuels	1)200
See dimethylamine	192	**Emission factors:** hydrocarbons - 2.0	––	13.1/1973	Synthesis: 11.6% choline chloride, 1.5% other (e.g., pharmaceutical), other quaternary ammonium salts; warning agent for natural gas; manufacture of disinfectants; flotation agent; insecticide attractant	1)534 3)1058 6)608 9)200 12) 13)47
Ammonolysis & dehydration, ammonolysis (Ammonia, carbon dioxide)	183 & 184	Air: ammonium carbamate, ammonia, urea particulates, monoethanolamine	––	3305/1973 3447/1974 3359/1975	About 76% fertilizer, 12% animal feed, 4% urea-formaldehyde resins, 2% melamine; plastics; chemical intermediate; stabilizer in explosives; medicine; adhesives; separation of hydrocarbons as urea adducts); sulfamic acid	1)460 1)462 2)942 3)467 6)657 7)21-54 11)37 13)47

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
402 (Continued) DP						
403	Vinyl acetate (Acetic acid vinyl ester) $CH_3COOCHCH_2$ $(C_4H_6O_2)$	000108054 (1V01V1)	—	Skn irr; narcotic in the presence of an inhib LCLo:4000 ppm/ 4H, ihl-rat LDLo:500 mg/kg, ipr-rat	USOS air: TWA 10 ppm or 30 mg/m^3	—
	Ditto	Ditto	—	Ditto	Ditto	—
404	Vinyl chloride (Ethylene, chloro) (Vinyl chloride nonomer, VCM) CH_2CHCl (C_2H_3Cl)	000075014 (G1U1)	500 rat	TCLo:20 ppm TFX:CVS, ihl-hmn Circulatory & bone changes in hmn workers; anesthetic; liver injury in rats & rbt	USOS air: TWA 1 ppm; Cl 5 ppm	Hmn carcinogen of the liver TCLo:500 ppm/ 4YI TFX:CAR, ihl-man LCLo:250 ppm/ 4H/130WI TFX:CAR, ihl-rat TCLo:250 ppm/ 35WI TFX:CAR, ihl-mus TDLo:500 ppm/ 4H/30WI TFX:CAR, ihl-ham TCLo:600 ppm/ 4H/(12-18D preg), TFX:CAR, ihl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
					production; flame-proofing agent; viscosity modifier for starch or casein-based paper coatings; reported helpful in treating sickle-cell anemia	
Oxyacetylation (Ethylene, acetic acid, oxygen, Pd catalyst)	95	**Air:** ethylene, acetic acid, vinyl acetate, acetaldehyde **Solids:** Polymers and mixed aldehydes	Scrubber	683/1973 638/1974 516/1975 764/1978	Manufacture: 39% polyvinylacetate latics, 16% polyvinylacetate resins, 15% polyvinyl alcohol (& butyral, formal derivs.), 7% vinyl chloride copolymers, 4% ethylene copolymers, 1% exports, 2% miscellaneous; latex paints; paper coating; adhesives; textile finishing; safety glass interlayers	1)260 2)34 3)1086 7)21-330; 340 11)37 13)47
Oxyacetylation (Acetylene, acetic acid, oxygen, Zn acetate on carbon catalyst)	174	**Air:** May emit traces of light ends (methyl acetylene, allene, acetylene) **Water:** May contain acetic acid	—	Ditto	Ditto	1)441
Pyrolysis (Ethylene dichloride)	133	**Air: kg/Mg** HCl (0.1), vinyl chloride (5), 1,2-dichloroethylene (0.15), 1,1-dichloroethylene (0.4), acetylene (1.5), acetaldehyde **Water:** Flow - 1.27 m^3/454 kg COD - 2.733 kg/m^3 3.475 kg/454 kg TOC - 0.120 kg/m^3 0.150 kg/454 kg **Solids: kg/Mg** Ethylene dichloride (0.8), heavy bottom tars, and solids (0.52)	Scrubber. Distillation recovery columns for HCl, VCM. Heavy bottoms (higher chlorinated organics) sent to waste disposal	2432/1973 2555/1974 1907/1975 3161/1978	97% Polyvinyl chloride resins; organic synthesis; adhesives for plastics; plasticals; decorative coatings; leather substitutes; drinking cups; printing ink; plasticizers; building and packaging industry	1)349 2)418 3)1087 7)21-402 11)37 13)47

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
405	Vinylidene chloride (Ethylene, 1,1-dichloro) CH_2CCl_2 (C_2H_3Cl)	000075354 (GYGU1)	LDLo:5750 dog	TCLo:25 ppm TFX:SYS, ihl-hmn LCLo:10,000 ppm/24H, ihl-rat LDLo:225 mg/kg, ivn-dog LDLo:3700 mg/kg, scu-rbt	10 ppm; 40 mg/m^3 (proposed 1974)	Experimental carcinogen 3)1088
406	Vinyltoluene (Styrene, methyl) $CH_2CHC_6H_4CH_3$ (C_9H_{10})	001319739 (1U1R X)	3160 mus LDLo:4900 rat	Chronic damage to kidneys & liver LC50:3020 mg/m^3, ihl-mus TCLo:29 mg/m^3/13WI TFX:TER, ihl-gpg	—	—
407G	Xylenes (mixed)	(1R X)	—	LC50:6700 ppm/4H, ihl-rat	NIOSH recommend std air: TWA 100 ppm or 435 mg/m^3	—
407 DP	m-Xylene $C_6H_4(CH_3)_2$ (C_8H_{10})	000108383 (1R C)	5000 rat	LCLo:2010 ppm/24H, ihl-mus LCLo:8000 ppm/4H, ihl-rat LDLo:2000 mg/kg, ipr-rat LDLo:5000 mg/kg, scu-rat	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—
408 DP	o-Xylene $C_6H_4(CH_3)_2$ (C_8H_{10})	000095476 (1R B)	LDLo:500 rat	LDLo:1500 mg/kg, ipr-rat LDLo:2500 mg/kg, scu-rat LCLo:6920 ppm, ihl-mus LCLo:6125 ppm, ihl-rat	Ditto	—
	Ditto	Ditto	Ditto	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Dehydrochlorination (1,1,2-Trichloroethane, aqueous sodium hydroxide, ferrous sulfate and caustic soda solutions)	139	**Water:** Flow 1.69 dm^3/sec, sodium hydroxide (45.5 kg/Mg), sodium chloride (605.5 kg/Mg, ferrous sulfate **Air:** vinylidene chloride, 1,1,2-trichloroethane **Emission factors:** hydrocarbons - 4.0	—	77.2/1974	Copolymerized with vinyl chloride or acrylonitrile to form various kinds of Saran; other copolymers are also made; adhesives; component of synthetic fibers; molded, extrusion & lacquer resins	1)362 2)420 3)1088 7)21-296 12)
Alkylation & dehydrogenation (Ethylene, toluene)	130	**Water:** toluene, HCl, aluminum salts, sodium hydroxide, NaCl, tars	—	—	Mostly unsaturated polyesters; solvent, intermediate	1)337 2)875 3)1090 13)48
—	—	—	—	2,627/1974 2,309/1975 391/1978	About 72% separated into	2)960 3)1095 11)36 13)48
See benzene & ethylbenzene	359	—	—	—	Solvent; intermediate for dyes & organic synthesis, especially isophthalic acid; insecticides; aviation fuel	1)826 2)960 3)1094 5)563
See benzene	349	—	—	Ditto	Ditto	1)803 2)960
See benzene & ethylbenzene	359	**Emission factors:** hydrocarbons - 20.0	—	485/1973 480/1974 308/1975 461/1978	About 61% synthetic phthalic anhydride; vitamin & pharmaceutical synthesis; dyes; insecticides; motor fuels; exports	1)826 2)960 3)1094 5)563 6)662 11)37 12) 13)48
See m-xylene & benzene	349	—	—	Ditto	Ditto	1)803

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
409 DP	p-Xylene $C_6H_4(CH_3)_2$ (C_8H_{10})	000106423 (1R D)	5000 rat	LDLo:2000 mg/kg, ipr-rat LDLo:5000 mg/kg, scu-rat LCLo:3460 ppm, ihl-mus LCLo:4912 ppm/ 24H, ihl-rat	NIOSH recommend std air: TWA 100 ppm or 435 mg/m^3	––
	Ditto	Ditto	Ditto	Ditto	Ditto	––
410G	Xylenol (Mixed 2,4-; 2,5-; 3,4-; 3,5-) $(CH_3)_2C_6H_3OH$ $(C_8H_{10}O)$	001300716	––	LDLo:50 mg/kg, orl-hmn	––	––
410	2,4-xylenol	000105679 (QR B D)	3200 rat 809 mus	LDLo:150 mg/kg, ipr-mus LD50:1040 mg/kg, skn-rat	––	TDLo:5600 mg/kg/ 28WI TFX:CAR, skn-mus
411	2,5-xylenol	000095874 (QR B E)	444 rat 383 mus 938 rbt	––	––	TDLo:5600 mg/kg, 28WI TFX:CAR, skn-mus
412	3,4-xylenol	000095658 (QR C D)	LDLo:500 orl-rat 400 mus 800 rbt	––	––	TDLo:5600 mg/kg/ 28WI TFX:CAR, skn-mus
413	3,5-xylenol	000108689 (QR C E)	608 rat 477 mus 1313 rbt	––	––	TDLo:5600 mg/kg/ 28WI TFX:CAR, skn-mus
414	2,6-xylenol	000576261 (QR B F)	296 rat 479 mus 980 mus 2)960 700 rbt	LD50:150 mg/kg, ipr-mus LD50:1000 mg/kg, skn-rbt	––	TDLo:4000 mg/kg/ 120WI TFX:NEO, skn-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
See benzene & ethylbenzene	359	—	—	1057/1973 1230/1974 1102/1975 1588/1978	Synthesis: about 60% DMT 25% TPA (used in polyester resins & fibers, e.g., "Dacron", "Mylar", "Terylene"); vitamin & pharmaceutical synthesis; insecticide; exports	1)826 2)960 3)1095 5)563 6)663 11)37 13)48
See m-xylene & benzene	349	—	—	Ditto	Ditto	1)803
See σ-cresol See o-, m-, and p-cresol	78 & 82	—	—	—	Disinfectants; solvents, pharmaceuticals, insecticides & fungicides; plasticizers; rubber chemicals; additives to lubricants & gasoline; manufacture of polyphenylene oxide (2,6-isomer only); wetting agents; dyestuffs	1)209 1)217 2)960
Ditto	Ditto	—	—	—	Ditto	2)960
Ditto	Ditto	—	—	—	Ditto	2)960
Ditto	Ditto	—	—	—	Ditto	Ditto
Ditto	Ditto	—	—	—	Ditto	2)960 3)1095
Methylation (Phenol, methanol, alumina catalyst)	297	Air: CH_3OH, phenol Water: ethers of cresols & xylenols, methanol, phenol	—	—	—	1)703 2)960 9)326

(Continued)

TABLE A-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
415G DP	Xylidine (mixed 2,3-; 2,r-; 2,5-; 2,60) $(CH_3)_2C_6H_5NH_2$ $(C_8H_{11}N)$	001300738 (ZR X X)	LDLo:610 rat LDLo:620 rbt	LDLo:50 mg/kg, orl-hmn Liver & blood damage; severe & possible fatal intoxication through skn abs LDLo:149 ppm, ihl-mus LDLo:120 mg/kg, ivn-cat LDLo:240 mg/kg, ivn-rbt	USOS air: TWA 5 ppm (skn) or 25 mg/m^3 (skn)	—
415	2,3-xylidine	000087592 (ZR B C)	933 rat 1072 mus	Ditto	Ditto	—
416	2,4-xylidine	000095681 (ZR B D)	467 rat 250 mus	Ditto	Ditto	—
417	2,5-xylidine	000095783 (ZR B E)	1297 rat 841 mus	Ditto	Ditto	—
418	2,6-xylidine	000087627 (ZR B F)	840 rat 707 mus	Ditto	Ditto	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Nitration & reduction (Nitroxylenes hydrogen, MoS_3 on inert support catalyst, aqueous NaOH wash)	364	Air: Some H_2 Water: sodium hydroxide	—	—	Dye intermediate; organic synthesis; pharmaceuticals; vitamins	1)840 2)961 3)1095 5)563
Ditto	Ditto	Ditto	—	—	Ditto	2)961 3)1095
Ditto	Ditto	Ditto	—	—	Ditto	2)961 3)1095
Ditto	Ditto	Ditto	—	—	Ditto	Ditto
Ditto	Ditto	Ditto	—	—	Ditto	2)961 3)1095 7)2-421

TABLE A-2. INDUSTRIAL ORGANIC CHEMICALS, ADDENDUM-TOXICITY,

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1 (125)	Acetyl chloride	000075365 (GV1)	—	TCLo:2 ppm/1M TFX:TRR, ihl-hmn High toxicity ihl & orl	—	—
2 (185)	Adiponitrile	000111693 (NC4CN)	300 rat	LD50:40 mg/kg, ipr-mus LD50:50 mg/kg, scu-gpg	—	—
3 (235)	p-Aminophenol (Phenol, p-amino)	000123308 (ZR DQ)	375 rat	LDLo:50 mg/kg, orl-hmn TCLo:1 mg/m^3 TFX:BLD, ihl-hmn LDLo:470 mg/kg, scu-mus LDLo:1500 mg/kg, scu-gpg	—	—
4G	Amylphenols (7 isomers)	—	—	—	—	—
	Amylphenol, n Phenol-p-pentyl	—	—	—	—	TDLo:4100 mg/kg/ 12WI TFX:NEO
(290)	Amyphenol, p-tert	00080466 (QR D1Y)	3080 rat	LD50:2000 mg/kg, skn-rat	—	—
5 DP	Benzidine	000092875 (ZR DR D2)	309 rat 214 mus 200 dog	LDLo:400 mg/kg, scu-dog	USOS carcinogen	TCLo:18 mg/m^3/ 13YI TFX:CAR; ihl-man TDLo:10 mg/m^3/ 56WI TFX:CAR, ihl-rat TDLo:4500 mg/kg/ 30DI TFX:CAR, orl-rat TDLo:2100 mg/kg/ 35WI TFX:CAR, scu-rat
6	Benzoyl peroxide	000094360 (RVOOVR)	950 rat	LDLo:500 mg/kg, orl-hmn TCLo:12 mg/m^3, TFX:PUL, ihl-hmn LCLo:700 ppm, ihl-mus	USOS air: TWA 5 mg/m^3	TDLo:25 gm/kg/ 42WI TFX:NEO, skn-mus

PROCESS, WASTE, PRODUCTION AND USE DATA

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	**Emission factors:** hydrocarbons - 2.0	—	18.2/1975	—	2)43 3)336 12)
—	—	**Emission factors:** butadiene - 33.9, HCl - 81.0	—	279/1975	—	2)55 3)344 12)
—	—	—	—	—	—	2)639 3)361 12)
Alkylation (Phenol, amylenes, BF_3 catalyst)	311	—	—	—	—	1)728
Ditto	Ditto	—	—	—	—	2)648
Ditto	Ditto	—	—	—	—	2)648 3)377 12)
—	—	—	—	—	Dye and pigment raw material	2)167 3)405
—	—	—	—	4.0/1973	—	2)215 3)409 9)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
7	1,4-Butanediol	000110634	1525 rat 2062 mus 2531 rbt 1200 gpg	LDLo:500 mg/kg, ipr-mus LD50:1370 mg/kg, ipr-rat	—	—
8	2,6-di-tert-butyl-p-cresol (Butylated hydroxy toluene, BHT)	000128370 (1X&&R BQ E CX)	2450 rat 2)312 3510 rat 3)551 1040 mus LDLo:940 mg/kg, orl-cat LDLo:2100 mg/kg, orl-rbt	TDLo:5500 mg/kg, (preg) TFX:TER, orl-rat LDLo:250 mg/kg, ipr-mus	Air: 10 mg/m^3	—
9	tert-butyl hydroperoxide	000075912 (QOX)	406 rat 710 mus	LC50:500 ppm/4H, ihl-rat LC50:350 ppm/4H, ihl-mus LD50:790 mg/kg, skn-rat LD50:87 mg/kg, ipr-rat	—	—
10	di-tert-butyl peroxide (t-butyl peroxide)	000110054 (1X&&OOX)	—	LD50:3210 mg/kg, ipr-rat	—	TDLo:585 mg/kg TFX:NEO, unk-mus
11	2-Butyrolactone	—	—	—	—	Experimental carcinogen, 3)453
12	tert-butyl perbenzoate (peroxybenzoic acid, t-butyl)	000614459 (1XOOVR)	4160 rat 2500 mus	—	—	TDLo:241 mg/kg/I, TFX:NEO, unk-mus
13	Calcium stearate	—	—	—	—	—
14 (785)	Caprolactam	000105602 (T7MVTJ)	2140 rat	TDLo:7 ppm TFX:IRR, ihl-hmn TDLo:1410 mg/kg, skn-rbt LDLo:950 mg/kg, scu-gpg	USOS air: TWA **Vapor** - 5 ppm or 20 mg/m^3 **TLV-dust** - 1 mg/m^3	Polycaprolactam TDLo:5 film discs/rat TFX:NEO, imp-rat
15	Caprolactone	—	4290 rat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)238
—	—	—	—	14.5/1973	—	2)312 3)551 9)
—	—	—	—	—	—	2)246 3)447
—	—	—	—	1.1/1973	—	2)246 3)553 9)
—	—	—	—	—	—	3)453
—	—	—	—	1.1/1973	—	2)626 3)450 9)
—	—	—	—	—	—	—
—	—	**Emission factors:** chloroethylene - 1.0	—	324/1975 416/1978	—	2)259 3)467 12)
—	—	—	—	—	—	—

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
16 (905)	Chlorobenzotrichloride	(GXGGR XG)	—	—	—	—
17	o-chloronitrobenzene (o-nitrochlorobenzene) (see also 105DP)	000088733 (WNR BG)	288 rat 135 mus	—	—	—
18	Chloroprene (1,3-butadiene, 2 chloro)	000126998 (1UYG1U1)	LDLo:1600 rat	TCLo:80 ppm TFX:CNS Moderate orl & ihl TDLo:39 mg/m^3/4H/48D TFX:MUT, ihl-rat LCLo:600 mg/m^3/8H, ihl-mus LCLo:2500 mg/m^3/8H, ihl-cat LDLo:96 mg/kg, ivn-rbt	USOS air: TWA 25 ppm (skn) or 90 mg/m^3	—
19	Chlorotrifluoromethane (Freon 13)	000075729	—	Mild irr	—	—
20	Citronellol (6-octen-1-ol, 3,7-dimethyl)	000106229 (Q2Y&3UY)	3450 rat	LDLo:100 mg/kg, ivn-mus LD50:2650 mg/kg, skn-rbt	—	—
21	Cyclohexanone oxime	000100641 (L6YTJ AUNQ)	—	LD50:250 mg/kg, ipr-mus	—	—
22 (1170)	Cyclooctadiene	—	—	—	—	—
23	Tris(2,3-dibromopropyl phosphate) (TBPP)	—	1010 rat	—	—	Experimental carcinogen
24	Dibutylmaleate	000105760 (40V1U1VOR)	3730 rat	LD50:150 mg/kg, ipr-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	2)158 3)496
—	—	—	—	—	—	2)236 3)499
—	—	**Emission factors:** CCl_4 - 1.0, HCl - 1.0	—	11/1975	—	2)536 3)839 9) 12)
—	—	—	—	—	—	2)604
—	—	—	—	—	—	2)327
—	—	**Emission factors:** hydrocarbons - 3.0	—	11/1975	—	9) 12)
—	—	—	—	—	Textile flame retardant	—
—	—	—	—	5/1973	—	2)521 3)552 9)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
25	m-Dichlorobenzene	—	—	—	—	—
26	Dichloromethyl ether (Ether, dichloromethyl)	000542881 (G101G)	210 rat	LCLo:8 ppm/4H, ihl-rat LC50:25 mg/m^3/6H, ihl-mus LD50:280 mg/kg, skn-rbt	USOS carcinogen	TDLo:100 ppb/4WI TFX:CAR, ihl-rat TDLo:135 mg/kg/58DI TFX:CAR, scu-rat TDLo:5 mg/m^3/82DI TFX:NEO, ihl-mus TDLo:5520 mg/kg/23WI TFX:NEO, skn-mus
27	2,4-Dichlorophenol	000120832 (QR BG DG)	580 rat 1600 mus	LD50:430 mg/kg, ipr-rat	—	—
28	Diethylenetriamine	000111400 (Z2M2Z)	1080 rat	LD50:74 mg/kg, ipr-rat LD50:1090 mg/kg, skn-rbt	Air: TWA 1 ppm (skn)	—
29	N,N-Dimethylacetamide	000127195 (1VN1&1)	—	TCLo:20 ppm TFX:SYS, ihl-hmn TDLo:600 mg/kg (preg) TFX:TER, ipr-rat LD50:2240 mg/kg, skn-rbt	USOS air: TWA 10 ppm (skn) or 35 mg/m^3	—
30	Dimethylaminoethanol	000108010 (Q2N1&1)	2340 rat	LD50:1020 mg/kg, ipr-mus LD50:961 mg/kg, scu-mus LD50:1370 mg/kg, skn-rbt	—	—
31	Dimethylcarbamoylchloride	000079447 (GVN1&1)	1000 rat	Strong irr & lachrymator LDLo:1.0 mg/kg, scu-mus	—	TCLo:1 ppm TFX:CAR, ihl-rat TDLo:17 gm/kg/70WI TFX:CAR, skn-mus TDLo:2560 mg/kg/64I TFX:NEO, ipr-mus TDLo:5200 mg/kg/26WI TFX:CAR, scu-mus

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	3)557 12)
—	—	—	—	—	—	2)412 3)564
—	—	—	—	—	—	2)643 3)565
—	—	—	—	—	—	2)365 3)577
—	—	—	—	—	—	2)4 3)595
—	—	—	—	1.9/1973	—	2)404 3)596
—	—	—	—	—	—	2)276 3)601

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
32 (1495)	1,1-Dimethylhydrazine	000057147 (ZN1&1)	122 rat	LC50:252 ppm/4H, ihl-rat LD50:60 mg/kg, ipr-mky LC50:3580 ppm/15M, ihl-dog	USOS air: TWA 0.5 ppm (skn) or 1 mg/m^3	TDLo:7902 mg/kg/30WC TFX:CAR, orl-mus
33	4,6-Dinitro-o-cresol	000534521 (WNR BZ C ENW)	25 rat 47 mus	LDLo:5 mg/kg, orl-hmn TCLo:1 mg/m^3 TFX:CNS, ihl-hmn LCLo:40 mg/m^3, ihl-cat	USOS air: TWA 0.2 mg/m^3 (skn)	—
34	Dioctyl maleate	—	—	—	—	—
35	Diphenylhydrazine	00053057	—	—	—	—
36	di-n-Propyl-amine	000142847 (3M3)	930 rat	LCLo:100 ppm/4H, ihl-rat LD50:1250 mg/kg, skn-rbt	—	—
37	Dodecylbenzene	—	—	Moderate toxicity	—	—
38	Ethyleneimine	000151564 (T3MTJ)	15 rat	LDLo:5 mg/kg, orl-hmn LCLo:25 ppm/8H, ihl-rat LC50:400 mg/m^3, ihl-mus LD50:3800 g/kg, ipr-rat	USOS carcinogen	TDLo:20 mg/kg/670I TFX:CAR, scu-rat TDLo:235 mg/kg/76WC TFX:CAR, orl-mus
39	2-Ethyl hexyl acrylate	000103117 (442&10V1 U1)	5660 rat 2)49 6500 rat 3)665	LD50:1600 mg/kg, skn-rbt	—	—
40	2-Furaldehyde (Furfural)	000098011 (T50J BVH)	127 rat 425 mus 2300 dog 541 gpg	LDLo:500 mg/kg, orl-hmn TDLo:0.6 mg/m^3 TFX:EYE, ihl-hmn	USOS air: TWA 5 ppm (skn) or 20 mg/m^3	—
41 (2091)	Glycerol Dichlorohydrin	000616239 (Q1YG1G)	150 rat	LCLo:125 ppm/4H, ihl-rat LD50:5 mg/kg, scu-mus	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	1.8/1975	—	2)465 3)607 9) 12)
—	—	—	—	—	—	2)312 3)617
—	—	—	—	3.5/1973	—	9)
—	—	—	—	—	—	—
—	—	—	—	8.3/1973	—	2)373 3)626 9)
—	—	—	—	217/1973 239/1978	Detergent alkylate	2)160 3)633
—	—	—	—	—	—	2)423 3)662
—	—	—	—	—	—	2)49 3)665
—	—	—	—	—	—	2)432 3)698
—	—	—	—	—	—	3)706 12)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
42 (2145)	Hexachlorobenzene (Perchlorobenzene)	000118741 (G 6-R)	3500 rat 4000 mus 1700 cat	LDLo:500 mg/kg, orl-hmn TDLo:500 mg/kg (7-11D preg) TFX:TER, orl-mus	—	—
43 (2165)	Hexamethylenediamine (1,6-Hexanediamine)	000124094 (Z6Z)	—	Moderate irr to skn, eye, mu mem, via orl & ihl LCLo:750 mg/m^3/10M, ihl-mus	—	—
44	Hexamethylene-diammoniumadipate	—	—	—	—	—
45	Hexamethyl phosphoric acid triamide (phosphoric triamide, hexamethyl)	000680319 (1N1&3PO1 N&3PO)	2650 rat (M) 3360 rat (F)	LDLo:3500 mg/kg, skn-rat	—	Squamous cell carcinogen TCLo:400 ppb/35WI TFX:CAR, ihl-rat
46	2-hexanone (methyl n-butyl ketone)	000591786 (4V1)	2590 rat 914 gpg	LCLo:6000 ppm/7H, ihl-gpg	USOS air: TWA 100 ppm or 410 mg/m^3	—
47	3-hexanone (ethyl-n-Propyl ketone)	(2V3)	3360 rat	LCLo:4000 ppm/4H, ihl-rat	—	—
48	Hexylalcohol (1-hexanol)	000111273 (Q6)	720 rat 1950 mus	LDLo:500 mg/kg, orl-hmn LD50:3100 mg/kg, skn-rbt	—	—
49	Hydrazine solutions (data for hydrazine) $H_2N\text{-}NH_2$	000302012 (ZQ)	60 rat	LC50:570 ppm/4H, ihl-rat LC50:252 ppm/4H, ihl-mus	USOS air: TWA 1 ppm (skn) or 1.3 mg/m^3	TDLo:410 mg/kg/26WC TFX:CAR, orl-mus TDLo:400 mg/kg/5WI TFX:CAR, ipr-mus
50	Ionone	— (LGUTJ A E E F1U1V1 & L6UTJ A B1U1V1 C C)	4950 rat	—	—	—
51	Isopentane	000078784 (24)	—	Simple asphyxiant	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	**Emission factors:** hydrocarbons - 2.0, HCl - 1.0	—	1.5/1975	—	2)61 3)716 9) 12)
—	—	**Emission factors:** adiponitrile - 0.1	—	—	—	2)456 3)720 12)
—	—	—	—	350/1973	—	9)
—	—	—	—	—	—	2)676 3)721
—	—	—	—	—	—	2)458 3)812
—	—	—	—	—	—	2)458 3)723
—	—	—	—	4.5/1973	—	2)460 3)722 9)
—	—	—	—	—	—	2)463 3)726
—	—	—	—	—	—	2)492
—	—	—	—	—	—	3)752 12)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
52	Isophthalonitrile	—	—	—	—	—
53	Isopropyl ether (propane,2,2'-oxybis)	060108203 (1Y & 0Y)	8470 rat	TDLo:800 ppm/5M/TFX:IRR, ihl-hmn LD50:812 mg/kg, ipr-mus	USOS air: TWA 500 ppm	—
54	Lactic acid	000050215 (QYVQ)	3730 rat 4875 mus 1810 gpg	LDLo:50 mg/kg, orl-hmn LDLo:471 mg/kg, idu-hmn LD50:4500 mg/kg, skn-mus	—	—
55	Lawroyl peroxide	000105748	—	Highly irr to skn, eye, mu mem TDLo:38 gm/kg/63WI TFX:NEO, skn-mus TDLo:330 mg/kg/82W TFX:NEO, scu-mus	—	—
56	Lead naphthenate (naphthenic acid, lead salt)	—	5100 rat	LD50:520 mg/kg, skn-rat	—	—
57	Melamine	000108781	LDLo:1600 mus	Irr, causes dermatitis LD50:4328 mg/kg, ipr-rat	—	—
58	Methionine, L-	000063683	—	Nutrient	—	—
59	Methyl acrylate	000096333 (1U1V01)	300 rat LDLo:280 rbt	TCLo:75 ppm TFX:IRR, ihl-hmn LCLo:1000 ppm/4H, ihl-rat LD50:1300 mg/kg, skn-rbt	USOS air: TWA 10 ppm (skn)	—
60	Methyl-n-amyl ketone (2-keptanone)	000110430 (5V1)	1670 rat 730 mus	LCLo:4000 ppm/4H, ihl-rat	USOS air: TWA 100 ppm or 465 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	2)756 3)756 9)
—	—	—	—	—	—	2)513 3)762
—	—	—	—	—	—	2)515 3)764
—	—	—	—	5.3/1973	—	3)769 9)
—	—	—	—	53.9/1973	—	2)525 3)791 9)
—	—	—	—	—	—	2)549 3)801 9)
—	—	—	—	—	—	2)50 3)805
—	—	—	—	—	—	2)452 3)376

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
61	Methyl bromide	000074839 (E1)	100 rat	LDLo:50 mg/kg, orl-hmn TCLo:35 ppm TFX:CNS, ihl-hmn TDLo:8000 ppm TFX:SKN, skn-hmn LCLo:514 ppm/6H, ihl-rat LCLo:300 ppm/9H, ihl-gpg	USOS air: CL 20 ppm (skn)	—
62	Methylene diisocyanate (MDI), (p,p^1-diphenylmethane diisocyanate) Methylenebis-4-phenylisocyanate	—	—	TCLo:0.13 ppm/30M TFX:ALR, ihl-hmn LD50:17 mg/kg, ipr-mus	USOS: air C 0.02 ppm	—
63	Methyl ionone	—	—	—	—	—
64 (2665)	Methyl methacrylate	000080626 (1UYV01)	8000 rat 6300 gpg LDLo:5000 dog	LDLo:5000 mg/kg, orl-hmn TCLo:125 ppm TFX:CNS, ihl-hmn TCLo:150 mg/m^3 TFX:CNS, ihl-hmn LD50:3750 ppm, ihl-rat	USOS air: TWA 100 ppm or 410 mg/m^3	—
65	Methyl salicylate	000119368 (QR BV01)	887 rat 2100 dog 1060 gpg	LDLo:170 mg/kg, orl-hmn LDLo:1500 mg/kg, scu-gpg TDLo:500 mg/kg (D preg) TFX:TER, scu-rat	—	—
66	Oxalic acid	000144627 (QVVQ)	LDLo:1000 mg/kg, dog	LDLo:0.071 mg/kg, orl-hmn 2)609 LDLo:100 mg/kg, orl-hmn 3)880	USOS air: TWA 1 mg/m^3	—
67	Paraformaldehyde (mistakenly listed as s-trixane or cyclic sym-trioxane in ref 2)	—	800 rat	LDLo:10,000 mg/kg, skn-rbt	—	—
68	Peracetic acid, 40% (Peroxyacetic acid)	000079210 (Q0V1)	1540 rat 10 gpg	LDLo:50 mg/kg, orl-hmn LD50:1410 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)535 3)810
—	—	—	—	—	—	2)537 3)820
—	—	—	—	—	—	—
—	—	**Emission factors:** acetone - 111.9, HCN - 6.8, methyl methacrylate - 3.6, hydroquinone - 0.5	—	398/1973	—	2)534 3)825 12)
—	—	—	—	—	—	2)849 3)832
—	—	—	—	—	—	2)609 3)880
—	—	—	—	—	—	2)934 3)885
—	—	—	—	—	—	2)626 3)891

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
69	2-pentanone (methyl propyl ketone)	000107879 (3V1)	3730 rat	LC50:2000 ppm/4H ihl-rat	USOS air: TWA 200 ppm or 700 mg/m^3	—
70	Piperidine	000110894 (T6MTJ)	400 rat	LCLo:4000 ppm/4H ihl-rat LD50:320 mg/kg, skn-rbt	—	—
71	Propyl acrylate	—	—	—	—	—
72	Propylene carbonate	—	29,000 rat	No orl toxicity	—	—
73	Salicylaldehyde	000090028 (VHR BQ)	—	LDLo:1000 mg/kg, scu-rat	—	—
74	Stearic acid	000057114 (QV17)	—	LD50:22 mg/kg, ivn-rat LD50:23 mg/kg, ivn-mus LDLo:5 mg/kg, ivn-cat	—	—
75	Sorbitol	003959533 (Q1YQYQYQ YQY1Q)	—	Low toxicity	—	—
76	Stilbene	—	—	Low ihl & orl toxicity	—	—
77 (3270)	Tannic acid	001401554	500 rbt LDLo:2000 mg/kg, mus	LDLo:500 mg/kg, orl-hmn LDLo:75 mg/kg, scu-mus LDLo:10 mg/kg, ivn-mus	—	TDLo:4450 mg/kg/ 17WI TFX:CAR, scu-rat
78	Terephthalonitrile (p-Dicyanobenzene)	000623267 (NCR DCN)	—	LD50:699 mg/kg, ipr-mus	—	—
79	Tetraethyleneglycol	000112607 (Q2020202Q)	29,000 rat	No orl toxicity	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
--	--	--	--	--	--	2)621 3)890
--	--	--	--	--	--	2)721 3)917
--	--	--	--	--	--	--
--	--	--	--	--	--	3)942
--	--	--	--	2.2/1973	--	2)846 3)962 9)
--	--	--	--	--	--	2)871 3)994
--	--	--	--	72.0/1973	--	3)992 9)
--	--	--	--	--	--	3)624
--	--	--	--	--	--	2)887 3)1007 12)
--	--	--	--	--	--	3)568
--	--	--	--	5.5/1973	--	2)890 3)1014 9)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
80	Tetrahydrofuran (Furan, tetrahydro)	000109999 (T5OTJ)	3000 rat	LDLo:50 mg/kg, orl-hmn TCLo:25,000 ppm TFX:CNS, ihl-hmn LD50:500 mg/kg, ipr-rat	USOS air: TWA 200 ppm or 590 mg/m^3	—
81 (3354)	2,4-toluene-diisocyanate (benzene, 2,4-diisocyanate-1-methyl)	—	6170 rat	LDLo:5000 mg/kg, orl-hmn TCLo:0.02 ppm/2Y TFX:PUL, ihl-hmn TDLo:0.5 ppm TFX:IRR, ihl-hmn LC50:14 ppm/4H, ihl-rat LC50:8 ppm/4H, ihl-rbt	USOS air: CL 0.02 ppm or 0.14 mg/m^3 NIOSH rec'd std Air: TWA 5 ppb	—
82 (3395)	1,1,1-trichloroethane (Methyl chloroform)	000071556 (GXGG)	750 dog 5600 rbt 14,300 rat	LDLo:500 mg/kg, orl-hmn TCLo:350 ppm TFX:PSY, ihl-man TCLo:920 ppm/ 70M TFX:CNS, ihl-hmn LCLo:27,000 mg/m^3/ 10M, ihl-man LCLo:1000 ppm, ihl-rat	USOS air: TWA 350 ppm or 1900 mg/m^3	—
83	2,4,6-trichlorophenol	000088062 (GR BG DG FG)	820 rat	LDLo:500 mg/kg, orl-hmn LD50:276 mg/kg, ipr-rat	—	TDLo:29 gm/kg, 78WI TFX:CAR
84	Tricresylphosphate (phosphoric acid, tritolyl ester)	001330785	3000 rat LDLo:4680 rat LDLo:500 dog LDLo:100 rbt	LDLo:1000 mg/kg, orl-hmn TDLo:6 mg/kg TFX:CNS, orl-hmn	—	—
85	Triethyleneglycol monoethyl ether (Dowanol TE)	000112505 (Q2O2O2O2)	—	—	—	—
86	Triethyleneglycol monomethyl ether (Methoxytriglycol)	—	11,000 rat	LD50:7100 mg/kg, skn-rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)435 3)1016
—	—	**Emission factors:** hydrocarbons - 14.0	—	—	—	2)159 3)1037 12)
—	—	—	—	—	—	2)398 3)1044 12)
—	—	—	—	—	—	2)649 3)1046
—	—	—	—	—	—	2)676 3)1048
—	—	—	—	10.6/1973	—	9)
—	—	—	—	13.2/1973	—	3)805 9)

(Continued)

TABLE A-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
87	Triethylenetetramine	000112243 (Z2M2M2Z)	4340 rat	LD50:820 mg/kg, skn-rbt	—	—
88	s-trioxane (formaldehyde cyclic trimer)	000110883 (T60 CO E) TJ)	800 rat	LDLo:50 mg/kg, orl-hmn LDLo:10,000 mg/kg, skn-rbt	—	—
89	Trimethylol propane	—	—	—	—	—
90	Triphenylphosphate	000115866 (ROPO&OR &OR)	3000 rat	LDLo:50 mg/kg, orl-hmn LD50:100 mg/kg, scu-cat	—	—
91	2-vinyl pyridine	—	—	Skn, eye, muc mem irr See pyridine	—	—
92	Xylylene diisocyanate (m-Xylene - diiocyanate)	—	4960 rat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)933 3)1052 9)
—	—	—	—	—	—	2)934 3)1066
—	—	—	—	—	—	—
—	—	—	—	—	—	2)676 3)1068
—	—	—	—	—	—	3)1089
—	—	—	—	—	—	2)960

TABLE A-3. INDUSTRIAL ORGANIC CHEMICALS,

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1 DP	Aluminum chloride $AlCl_3$	007446700 (AL Ge)	3700 rat 3805 mus	—	—	—
2	Aluminum hydroxide $Al(OH)_3$	012645512	—	—	—	—
3 DP	Ammonia NH_3	007664417 (ZH)	350 rat	LCLo:10,000 ppm/ 3H, ihl-hmn TCLo:20 ppm TFX:IRR, ihl-hmn Irr to eyes & mucous mem of respiratory track	USOS air: TWA 50 ppm	—
4	Ammonium carbonate $(NH_2)_2CO_3$	—	—	96 ivn-mus	—	—
5 DP	Ammonium chloride NH_4Cl	012125029 (Z&G)	1650 rat	Nausea, vomiting, and acidosis	Air: TWA 10 mg/m^3	—
6	Ammonium sulfate $(NH_4)_2SO_4$	007783202 (Z&2 S-04)	58 rat	—	—	—
7	Boron trifluoride BF_3	007637072 (FBFF)	—	LCLo:75 ppm, ihl-rat Corrosive to skn, irr to eyes & mucous mem	USOS air: CL 1 ppm	—
8 DP	Bromine Br_2	007726956 (E2)	—	LCLo:180 ppm/7H, ihl-rbt. Irr to eyes & upper respiratory track; pulmonary edema	USOS air: TWA 0.1 ppm	—
9 DP	Clacium carbonate $CaCO_3$	001317653	4500 rat	—	—	—
10 DP	Calcium chloride $CaCl_2$	010043524 (CAG2)	1000 rat (Ref 2) 4000 rat (Ref 4)	—	—	—
11	Calcium hydroxide $Ca(OH)_2$	001305620	7340 rat	Caustic reaction; skn irr; affects respiratory system	—	—
12 DP	Calcium oxide CaO	001305788	—	—	USOS air: TWA 5 mg/m^3	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)58 3)374 6)701A
—	—	—	—	—	—	—
—	—	—	—	—	—	2)70 3)386 6)702B
—	—	—	—	—	—	2)73 3)388
—	—	—	—	—	—	2)74 3)389
—	—	—	—	—	—	2)99 3)396
—	—	—	—	—	—	3)469 6)161
—	—	—	—	—	—	3)471
—	—	—	—	—	—	3)509
—	—	—	—	—	—	2)263 4)191 6)723
—	—	—	—	—	—	3)511 4)193
—	—	—	—	—	—	2)264

(Continued)

TABLE A-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
12 DP	Calcium oxide CaO	001305788	––	––	USOS air; TWA 5 mg/m^3	––
13 DP	Carbon dioxide CO_2	000124389	––	TDLo:6 pph/100 preg, TFX:TER, ihl-rat Simple asphyxiant	USOS air: TWA 5000 ppm	––
14	Carbon monoxide CO	000630080 (C O)	––	LCLo:4000 ppm/30 M, ihl-man TCLo:650 ppm/45 M, TFX:CNS, ihl-man Asphyxia; deprives tissue of oxygen by reaction in blood	USOS air: TWA 50 ppm	––
15 DP	Chlorine Cl_2	007782505 (G2)	––	TCLo:15 ppm, TFX:PUL, ihl-hmn LCLo:430 ppm/30M, ihl-hmn Irr to eyes & mucous mem; lung tissue is affected; pulmonary edema	USOS air: TWA 1 ppm	––
16 DP	Copper sulfate $CuSO_4$	007758987 (CU S-04)	300 rat	––	USOS air: TWA 1 mg/m^3 (as Cu)	––
17 DP	Cuprous chloride Cu_2Cl_2	––	––	––	––	––
18	Cuprous oxide Cu_2O	001317391	––	––	USOS air: ?	––
19	Ferric chloride $FeCl_3$	007705080 (FE G3)	900 rat 440 mus	––	Air: TWA 1 mg/m^3	––
20	Ferrous sulfate (Iron (11) sulfate) $FeSO_4$	007720787 (FE S-04)	1480 rat 1170 mus LDLo:50 chd	––	––	TDLo:1600 mg/kg/16 WC, TFX:NEO, scu-mus
21	Hydrochlorous acid $HClO$	007790923	––	––	––	––
22	Hydrogen H_2	001333740	––	Simple asphyxiant in high concn	––	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)264
—	—	—	—	—	—	2)293 3)519 6)727A
—	—	—	—	—	—	2)295 3)520
—	—	—	—	—	—	2)307 3)539 6)728A
—	—	—	—	—	—	2)345 6)733B
—	—	—	—	—	—	—
—	—	—	—	—	—	2)345
—	—	—	—	—	—	2)553 3)765
—	—	—	—	—	—	2)648 6)734B
—	—	—	—	—	—	—
—	—	—	—	—	—	4)544

(Continued)

TABLE A-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
23	Hydrogen bromide HBr	010035106	—	TCLo:5 ppm, TFX:IRR, ihl-hmn Strong irr to mucous mem, eyes, respiratory tract, skn	USOS air: TWA 3 ppm	—
24	Hydrogen chloride HCl	007647010 (GH)	900 rbt	LCLo:1300 ppm/30M, ihl-hmn Irr to eyes & upper respiratory tract; pulmonary edema	USOS air: CL 5 ppm	—
25	Hydrogen fluoride HF	007664393 (FH)	LDLo:80 gpg	TCLo:32 ppm, TFX:IRR, ihl-hmn TCLo:110 ppm/1M, TFX:IRR, ihl-man Irr to skn & mucous mem	USOS air: TWA 3 ppm	—
26	Hydrogen peroxide H_2O_2	007722841	—	Irr to body tissue, skn blistering; eye irr	USOS air: TWA 1 ppm	—
27	Iron oxide (Iron III oxide)	001309371	—	—	—	—
28	Lithium phosphate Li_3PO_4	021324403	—	—	—	—
29	Manganese acetate (Manganese, bis (acetato)-) $Mn(C_2H_3O_2)_2$ $C_4H_6MnO_4$	021501768	—	Chronic poisoning affects CNS; may result in permanent disability; upper respiratory infection	—	—
30	Meta boric acid (Boric acid) HBO_2 (Boric acid) $H_3B_3O_6$	013460509	—	—	—	—
31	Nitric acid HNO_3	007697372	—	—	USOS air: TWA 2 ppm	—
32	Nitrogen N_2	017778880	—	Nontoxic generally; simple asphyxiant in high concn	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)619 3)815
—	—	—	—	—	—	2)619 3)816 6)729A
—	—	—	—	—	—	2)610 3)817 6)735B
—	—	—	—	—	—	2)621 3)818 6)738B
—	—	—	—	—	—	3)769
—	—	—	—	—	—	—
—	—	—	—	—	—	3)885
—	—	—	—	—	—	—
—	—	—	—	—	—	2)795 3)961 6)737B
—	—	—	—	—	—	3)967 4)738

(Continued)

TABLE A-3. (Continued)

Item No	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
33	Nitrogen dioxide	010102440 (ONO)	—	TCLo: 64 ppm, TFX:PUL, ihl-hmn Highly toxic; deadly poison; inflammation of the lungs, edema, & death	USOS air: TWA 5 ppm	—
34	Nitrosyl sulfuric acid (Nitrosyl sulfate) NO_2HSO_3	007782787	—	—	—	—
35	Oxygen O_2	007782447	—	Nontoxic as a gas; causes burns as a liquid, damages tissue on contact with skn	—	—
36	Phosphates	014265442	—	—	—	—
37	Phosphoric acid H_3PO_4	007664382 (H3 P-04)	1530 rat	TCLo:100 mg/m^3, TFX:IRR, ihl-hmn Irr to skn and mucous mem	USOS air: TWA 1 mg/m^3	—
38	Phosphorus tribromide PBr_3	007789608	—	Highly toxic & corrosive	—	—
39	Potassium chloride KC1	007447407 (KG)	2500 gpg LDLo:2430 rat	Large orl doses causes GI irr, purging, weakness & circulatory problems	—	—
40	Potassium cyanide KCN	000151508 (KA CN)	10 rat 16 mus 5 rbt 1.6 dog	Poisoning by ing, skn abs, ihl. Strong solutions are corrosive to skn	USOS air: TWA 5 mg/m^3 (skn)	—
41	Potassium hydrosulfide (Potassium sulfide) HKS	001310618	—	—	—	—
42	Potassium sulfide K_2S	001312738	—	—	—	—
43	Sodium bicarbonate $NaHCO_3$	000144558 (QVA &-NA)	4220 rat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)798 3)967 4)739
—	—	—	—	—	—	3)975
—	—	—	—	—	—	3)989
—	—	—	—	—	—	—
—	—	—	—	—	—	2)897 3)1022 4)824
—	—	—	—	—	—	3)1026
—	—	—	—	—	—	2)951 3)1042 4)853
—	—	—	—	—	—	2)951 4)853
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	2)1062

(Continued)

TABLE A-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
44	Sodium bromide NaBr	007647156 (NA E)	3500 rat	—	—	—
45 DP	Sodium carbonate Na_2CO_3	000497198 (QVQ &-NA-2)	LDLo:4000 rat	117 ipr-mus. Sensitivity reactions occur from repeated topical use; ing may produce corrosion of the GI tract, vomiting, & diarrhea	—	—
46 DP	Sodium chloride NaCl	007647145 (NA G)	3000 rat 4000 mus TDLo:8200 mg/kg/23D, TFX:BPR, hmn	Irr to eyes	—	—
47 DP	Sodium cyanide NaCN	000143339 (NC -NA-)	6400 rat	Very poisonous. Toxicity is similar to hydrogen cyanide	USOS air: TWA 5 mg/m^3 (skn)	—
48 DP	Sodium dichromate (Dichromic acid, disodium salt) $Na_2Cr_2O_7$	010588019 (NA CR2-05-Q2)	—	Caustic and irr	USOS air: CL 100 μg/m^3	TDLo:160 mg/kg/69WI, TFX:NEO, ipr-rat
49	Sodium hydrosulfide NaSH	016721805	—	—	—	—
50 DP	Sodium hydroxide NaOH	001310732 (NA Q)	LDLo:500 rbt	400 ipr-mus Corrosive to body tissue, vegetable tissue, & corrosive to aluminum metal in the presences of moisture. Damage to respiratory tract.	USOS air: TWA 2 mg/m^3	—
51	Sodium perborate $NaBO_3$	007632044	—	—	—	—
52	Sodium sulfate Na_2SO_4	007757826 (NA2 S-02-Q2)	—	LDLo: 4470 rbt	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)1062 4)955
—	—	—	—	—	—	2)1062 3)1105 6)730B
—	—	—	—	—	—	2)1062 3)1106
—	—	—	—	—	—	2)1063 3)1107
—	—	—	—	—	—	2)413 3)1107 6)733A 8)129
—	—	—	—	—	—	7)759B
—	—	—	—	—	—	2)1065 3)1111 4)960 6)730A
—	—	—	—	—	—	—
—	—	—	—	—	—	2)1070 6)760

(Continued)

TABLE A-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
53 DP	Sodium sulfide Na_2S	001313822	––	53 ipr-mus	––	––
54	Sodium sulfite Na_2SO_3	00757837	TDLo:57 TFX: UNK, orl-hmn TDLo:7 TFX: CNS, orl-hmn LDLo:1181 orl-rbt	––	––	––
55	Sulfur dioxide SO_2	007446095 (050)	––	TCLo:3 ppm/5D, TFX:PUL, ihl-hmn TDLo:10 ppm/5M, TFX:PUL, ihl-man Irr to eyes; corrosive; poison; edema of the lungs; respiratory paralysis; excessive exposure can be fatal	USOS air: TWA 5 ppm or 13 mg/m^3	––
56 DP	Sulfuric acid H_2SO_4	007664939 (WSQQ)	2140 rat	TCLo:800 g/m^3, TFX:MTH, ihl-hmn TCLo:350 g/m^3/3M, TFX:PUL, ihl-hmn. Burns; caustic; nicrotis. Corrosive to all body tissues; ihl may cause serious lung damage; contact with eyes may cause total loss of vision; ing may cause serious inury and death	USOS air: TWA 1 mg/m^3	––
57	Sulfur trioxide SO_3	007446119	––	Corrosive and irr to mucous mem	––	––

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)1070 6)763
—	—	—	—	—	—	2)1070 6)763
—	—	—	—	—	—	2)1096 3)1133
—	—	—	—	—	—	2)1096 3)1134 6)776
—	—	—	—	—	—	3)1136 4)1006

(Continued)

TABLE B-1. ORGANIC DYES AND PIGMENTS, RAW MATERIALS-TOXICITY

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1	Alkyl thioureas	—	—	—	—	—
2	di-t-Amylphenol	000120956	330 rat	See phenol	—	—
3	Antimony potassium tartrate	000304610 (QVYQYQ VO-SB-O&-KA-)	115 rat 600 mus	LDLo:2 mg/kg, orl-hmn LD50:50 mg/kg skn 8 ivn-mus	USOS air: TWA 0.5 mg/m³ (as Sb)	—
4	Carbazole	000086748 (T B656 HMJ)	500 rat	Allergen, toxicity unknown LD50:200 mg/kg, ipr-mus	—	—
5	Cellulose Waste	—	—	—	—	—
6	p-Chlorobenzenesulfonic acid	—	—	—	—	—
7	4-Chloro-3-nitrobenzoic acid	000096991	75 bdw 3150 rat	—	—	—
8	p-Chloro-α, α, α-trifluorotoluene (p-chlorobenzotrifluoride)	—	—	Slightly toxic	—	—
9	Cyclohexyl alcohol	000108930 (L6TJ AQ)	2060 rat 2200 rbt	LDLo:500 mg/kg, orl-hmn TCLo:75 ppm TFX:IRR, ihl-hmn causes kidney, liver, bld damage	USOS air: TWA 50 ppm USOS air: TWA 200 mg/m³	—
10	2,4-Diaminotoluene	000095807 (ZR CZ D)	LDLo:500 rat	LDLo:50 mg/kg, orl-hmn LDLo:200 mg/kg, scu-dog Causes kidney damage. Allergen.	—	TDLo:11 gm/kg/36WC, TFX:CAR orl-rat
11	Dimethylamine	000124403 (1M1)	698 rat 316 mus 240 rbt	—	USOS air: TWA 10 ppm USOS air: TWA 18 mg/m³	—
12	p-Dodecyl aniline	—	—	—	—	—

PROCESS, WASTE, PRODUCTION AND USE DATA

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	2)645
—	—	—	—	—	—	2)106 3)384
—	—	—	—	—	—	2)279 3)468
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	2)188
—	—	—	—	—	—	3)489
—	—	—	—	—	—	2)326 3)529
—	—	—	—	—	—	2)914 3)1035
—	—	—	—	—	—	2)367 3)595
—	—	—	—	—	—	—

(Continued)

TABLE B-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
13	Glucose (corn sugar), D	000050997	25,800 rat 8,000 dog 20,000 rbt	—	—	—
14	Hematin	—	—	—	—	—
15	Hydrazine	000030212 (ZQ)	60 rat	High toxicity orl, skn, & ivn. Causes liver & bld damage LC50:570 ppm/ 4H, ihl-rat LD50:20 mg/kg, ivn-rbt	USOS air: TWA 1 ppm USOS air: TWA 1.3 mg/m^3	TDLo:400 mg/kg/ 5WI, TFX:CAR ipr-mus TDLo:410 mg/kg/ 26WC TFX:CAR, orl-mus
16	3-Hydroxybenzenesulfonic acid	—	—	—	—	—
17	4-Hydroxybenzenesulfonic acid	—	—	Details unknown, less toxic than phenol	—	—
18	p-Hydroxybenzoic acid	000099967 (QVR DQ)	2200 mus	LD50:210 mg/kg, ipr-mus	—	—
19	Logwood extracts	—	—	—	—	—
20	Mesitylene	000108678 (1R C E)	—	TCLo:10 ppm TFX:CNS ihl-hmn LDLo:2240 ppm/ 24H, ihl-rat	USOS air: TWA 25 ppm	—
21	Methanesulfonic acid	000075752 (WSQ1)	LDLo:200 rat	Highly irr skn, eye, mu mem LDLo:50 mg/kg, ipr-rat	—	—
22	Methyl isopropyl ketone (2-Butanone-3-methyl)	000563804 (1YY1)	148 rat	LCLo:5700 ppm/ 4H, ihl-rat	—	—
23	Methyl mercaptan	000074931 (SH1)	—	LD50:2.4 mg/kg, scu-mus LDLo:10,000 ppm, ihl-rat	USOS air: TWA 0.5 ppm USOS air: TWA 1 mg/m^3	—
24	p-Nitrobenzoyl chloride	—	—	Highly irr skn, eye, muc mem. Details unk.	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)440
—	—	—	—	—	—	—
—	—	—	—	—	—	2)463 3)726
—	—	—	—	—	—	—
—	—	—	—	—	—	3)898
—	—	—	—	—	—	2)192
—	—	—	—	—	—	—
—	—	—	—	—	—	2)533 3)799
—	—	—	—	—	—	2)538 3)801
—	—	—	—	—	—	2)243
—	—	—	—	—	—	2)539 3)824
—	—	—	—	—	—	3)857

(Continued)

TABLE B-1. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
25	Oxalic acid	000144627 (QVVQ)	LDLo:1000 dog	LDLo:100 mg/kg, orl-hmn LDLo:112 mg/kg, scu-cat	USOS air: TWA 1 mg/m^3	—
26	i-Propylamine	—	—	—	—	—
27	Pyrene	000129000 (L666 B6 2AB PJ)	—	—	—	TDLo:10 gm/kg/ 3WI, TFX:NEO skn-mus
28	Quebracho extract (Quebrachine)	000146485 (T F6 D5 C666 EM ON & & TTTJ TQ UVO1 A&TU)	LDLo:25 mus	LDLo:11 mg/kg, ivn-rbt LD50:34 mg/kg, scu-frg	—	—
29	Thiourea	000062566 (ZVZUS)	125 rat 11,500 mus	TDLo:1600 mg/kg/ 5W, TFX:BLD, orl-wmn Highly toxic. Causes anemia & skn allergy	—	TDLo:18 gm/kg/ 2YC, TFX:NEO orl-rat
30	Toluene	000108883 (1R)	5000 rat	LDLo:50 mg/kg, orl-hmn TCLo:200 ppm TFX:CNS ihl-hmn TCLo:100 ppm TFX:PSY ihl-man LC50:5300 ppm ihl-mus	USOS air: TWA 200 ppm or 750 mg/m^2 NIOSH rec. std.: TWA 100 ppm, C 200 ppm/10M	—
31	o-Toluenesulfonic acid	—	—	High irr skn, eye, muc mem, orl, ihl	—	—
32	Trimellitic anhydride	000552307 (T56 BVOVJ GVQ)	2210 mus	Highly toxic. Has caused pulmonary edema. Alergen.	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	—	—	—	—	—	2)609 3)880
—	—	—	—	—	—	—
—	—	—	—	—	—	2)794 3)947
—	—	—	—	—	—	2)1204 3)1097
—	—	—	—	—	—	2)953 3)1030
—	—	—	—	3400/1974 4204/1978	—	2)913 3)1035
—	—	—	—	—	—	3)1036
—	—	—	—	—	—	2)166 3)1058

TABLE B-2. ORGANIC DYES AND PIGMENTS' INTERMEDIATES-TOXICITY,

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1	Acetamide, N-(3-amino-4-ethoxy phenol)-	017026812	—	—	—	—
2	Acetamide, N-(4-amino-phenyl)-N-methyl-	000119631	30 rat	Mild irritant, low toxicology	—	—
3	Acetamide, N-(4-bromo-9,10-dihydro-9,10-dioxo-1-anthracenyl)-	—	—	—	—	—
4	Acetamide, 2-chloro-N-(4-nitrophenyl)-	017329872	—	—	—	—
5	Acetamide, N-(7-hydroxy-1-naphthalenyl)-	006470184	—	—	—	—
6	Acetamide, N-(4-hydroxy-2-nitrophenyl)-	007403750	—	—	—	—
7	Acetamide, N-methyl-N-[4-p-toluidino-1-anthraquinonyl]-	—	—	—	—	—
8	Acetamide, N-[2'-nitro-3'-(7H-benz[de] anthracen-7-one]-	—	—	—	—	—
9	Acetamide,N-(7-oxo-7H-benz[de] anthracen-3-yl)-yl)-	053652258	—	—	—	—
10	Acetanilide	000103844 (1VMR)	800 rat	LDLo:1000 mg/kg, ipr-mus	—	—
11	Acetanilide, 3'-amino-	000102283	1830 rat	—	—	—
12	Acetanilide, 4'-amino-	000122805 (ZR DMV1)	3350 rat	—	—	—
13	Acetanilide,3'-[bis-(2-hydroxyethyl)amino]-	027059081	—	—	—	—
14	Acetanilide, 2'-chloro-	000533175 (GR BMV1)	—	—	—	—

(a) Process number = Figure number, page number (reference 15).

Process (Sources of Compound)	Process[a] No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	9c, 29	—	—	—	—	—
—	2c, 18	—	—	—	—	3)349
—	343, 56	—	—	—	—	—
—	7d, 23	—	—	—	—	—
—	23b, 35	—	—	—	—	—
—	27,47	—	—	—	—	—
—	34e,56	—	—	—	—	—
—	34c,54	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	2a, 16	—	—	1.691/1974	—	2)9 3)349
—	25c, 45	—	—	—	—	2)9
—	2a, 16	—	—	—	—	2)9
—	25c, 45	—	—	—	—	—
—	7d, 23	—	—	—	—	2)9

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
15	Acetanilide, N-2-cyanoethyl- (See Propionitrile, 3-(N-acetanilino)-					
16	Acetanilide, 2',4'-dichloro-	006975297	—	—	—	—
17	Acetanilide, 2',5'-dimethoxy-	003467592	—	—	—	—
18	Acetanilide, 2',5' dimethoxy-4'-nitro-	025445130	—	—	—	—
19	Acetanilide, 2',4'-dinitro	000610537	—	—	—	—
20	Acetanilide, 4'-hydroxy-	000103902 (QR DMV1)	2400 rat	LDLo:3700 mg/kg, ivn-rbt	—	—
21	Acetanilide, N-methyl-	000579102 (1VN1&R1 VN&R)	155 mus	LDLo:125 mg/kg, ipr-mus	—	—
22	Acetanilide, N-methyl-4'-nitro-	000121959	—	—	—	—
23	Acetanilide, 2'-nitro-	000552399	—	—	—	—
24	Acetanilide, 3'-nitro-	000122281	—	—	—	—
25	Acetanilide, 4'-nitro-	000104041 (WNR DMV1)	—	LDLo:500 mg/kg, ipr-rat	—	—
26	o-Acetanisidide	000093265	940 mus	—	—	—
27	p-Acetanisidide	000051661 (1VMR DO1)	1190 mus	—	—	—
28	p-Acetanisidide, 2' nitro-	000119813	—	—	—	—
29	o-Acetanisidide, 4'-nitro-	000093276	—	—	—	—
30	o-Acetanisidide, 5'-nitro-	033721549	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	2a, 16	—	—	—	—	—
—	19, 33	—	—	—	—	—
—	19, 33	—	—	—	—	—
—	7e, 24	—	—	—	—	—
—	27, 47	—	—	—	—	2)11
—	2c, 18	—	—	—	—	2)11
—	2c, 18	—	—	—	—	—
—	2a, 16	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	2a, 16	—	—	—	—	2)11
—	7c, 22	—	—	—	—	2)12
—	9a, 27	—	—	—	—	2)12
—	9a, 27	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	7c, 22	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
31	Acetic acid, [4-(chloro-o-tolyl-thio] -	000094768	—	—	—	—
32	Acetic acid, (2-naphthyl-thio)-	000093210	—	—	—	—
33	Acetoacetanilide	000102012 (1V1VMR)	—	LDLo:300 mg/kg, ipr-mus, weak allergen	—	—
34	Acetoacetanilide, 2'-chloro-	000093709	—	—	—	—
35	Acetoacetanilide, 4'-chloro-	000101928 (GR DMV1V1)	—	LDLo:500 mg/kg, ipr-mus	—	—
36	Acetoacetanilide, 4'-chloro-2',5'-dimethoxy-	004433798	—	—	—	—
37	o-Acetoacetanisidide	000092159	—	—	—	—
38	p-Acetoacetophenetide	000122827	—	—	—	—
39	o-Acetoacetotoluidide	000093685	—	—	—	—
40	p-Acetoacetotoluidide	002415852	—	—	—	—
41	o-Acetoacetotuluidide, 4'-chloro-	020139553	—	—	—	—
42	o-Acetoacetotuluidide, 4'-nitro-	—	—	—	—	—
43	2',4'-Acetoacetoxylidide	000097369	—	—	—	—
44	p-Acetophenetide	000062442 (ZOR DMV1)	1650 rat	TDLo:1000 mg/kg, TFX:CNS	—	—
45	p-Acetophenetide, 3'-[bis (2-hydroxyethyl)] amino-	021615292	—	—	—	—
46	p-Acetophenetide,3'-[di (2-acetoxyethyl)-amino] -	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	28, 47	—	—	—	—	—
—	44, 35	—	—	—	—	—
—	4, 16	—	—	—	—	2)28 3)350
—	7d, 23	—	—	—	—	—
—	9a, 27	—	—	—	—	2)28
—	19, 33	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	9c, 29	—	—	—	—	—
—	4, 48	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	12, 49	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	4, 63	—	—	—	—	—
—	9c, 29	—	—	—	—	2)31 3)353
—	9c, 29	—	—	—	—	—
—	9c, 29	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
47	p-Acetophenetide, 3'-nitro-	001777840	664 rat	—	—	—
48	o-Acetotuluidide	025449096 (1VMR B)	1450 mus	—	—	—
49	p-Acetotuluidide	000103899	—	Unknown	—	—
50	p-Acetotuluidide, 3'-amino-	—	—	—	—	—
51	o-Acetotuluidide, 4'-amino	—	—	—	—	—
52	p-Acetotoluidide, 3'-chloro-	007149793	—	—	—	—
53	o-Acetotoluidide, 4'-chloro-	005202868	—	—	—	—
54	o-Acetotoluidide, 4'-(N,N-diethylamino)-	—	—	—	—	—
55	p-Acetotoluidide, 3'-nitro-	002719144	—	—	—	—
56	Aniline derivatives (See also Benzenamine)					
57	Aniline, 2-bromo-6-chloro-4-nitro	—	—	—	—	—
58	Aniline, N-butyl-	001126789 (4MR)	1620 rat	—	—	—
59	Aniline, N-n-butyl-N (2-chloroethyl)-	—	—	—	—	—
60	Aniline, N-butyl-N-(2-hydroxyethyl)- See Ethanol, 2-[N-n-butylanilino]-					
61	Aniline, m-chloro-	000108429 (ZR CG)	880 rat	LDLo:310 mg/kg, scu-cat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	9c, 29	—	—	—	—	2)31
—	29a, 48	—	—	—	—	2)33
—	30, 50	—	—	—	—	3)353
Reduction	30, 50	—	—	—	—	—
Reduction	29b, 49	—	—	—	—	—
—	12, 50	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	12, 29	—	—	—	—	—
—	2b, 17	—	—	—	—	2)106
—	2b, 17	—	—	—	—	—
—	25b, 44	—	—	—	—	2)106

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
62	Aniline, o-chloro-	000095512 (ZR BG)	256 mus	LDLo:310 mg/kg, scu-cat	—	—
63	Aniline, p-chloro-	000106478 (ZR DG)	300 rat	TCLo:44 mg/m^3 ihl-hmn TFX:BLD	—	—
64	Aniline, 4-chloro-2,5-dimethoxy-	006358641 (1OR BZ EG DO1)	100 bdw	—	—	—
65	Aniline, 5-chloro-2,4-dimethoxy-	000097507	—	—	—	—
66	Aniline, 2-chloro-4,6-dinitro-	003531199	—	—	—	—
67	Aniline, N-(2-chlorethyl)-N-ethyl-	000092499	—	—	—	—
68	Aniline, N-(2-chloroethyl)-N-methyl-	001669858	—	—	—	—
69	Aniline, 2-chloro-4-nitro-	000121879 (ZR BG DNW)	—	LDLo:500 mg/kg, ipr-mus	—	—
70	Aniline, 2-chloro-nitro-	006283256	—	—	—	—
71	Aniline, 4-chloro-2-nitro-	000086634 (ZR DG BNWZR DOG BNW)	—	LD50:63 mg/kg, ivn-mus	—	—
72	Aniline, 4-chloro-3-nitro-	000635223	100 bdw	—	—	—
73	Aniline, 2,6-dibromo-4-nitro-	000827411 (ZR DG CNW)	—	—	—	—
74	Aniline, 2,4-dichloro-	000554007 (ZR BG DG)	LDLo:157 mg/kg, orl-cat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	45, 23	—	—	—	—	2)106
—	9a, 27	—	—	—	—	2)106
—	19, 33	—	—	—	—	2)106
—	40, 63	—	—	—	—	—
—	12, 24	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	6, 18	—	—	—	—	—
—	7d, 23	—	—	—	—	2)106
—	7e, 24	—	—	—	—	—
—	9c, 29 18, 32	—	—	—	—	2)106
—	7e, 24 9a, 27	—	—	—	—	—
—	12, 16	—	—	—	—	—
—	2a, 16 25b, 44	—	—	—	—	2)107

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
75	Aniline, 2,5-dichloro-	000095829	—	—	—	—
76	Aniline, 3,4-dichloro-	000095761 (ZR CG DG)	648 rat	TCLo:25 g/m^3 ihl-hmn TFX:EYE	—	—
77	Aniline, 2,6-dichloro-4-nitro-	006627345 (ZR BG FG DNW)	1500 rat	LDLo:1500 mg/kg, orl-rat	—	—
78	Aniline, 2,5-diethoxy-	000094859	—	—	—	—
79	Aniline, N,N-diethyl-	000091667	—	—	—	—
80	Aniline, N-N-diethyl-p-nitroso-	000120229	—	—	—	—
81	Aniline, 2,5-dimethoxy-	000102567 (1OR BZ DO1)	100 bdw	—	—	—
82	Aniline, 2,5-dimethoxy-4-nitro-	006313377	—	—	—	—
83	Aniline, N,N-dimethyl-	000121697 (1N1 &R)	LDLo:1410 mg/kg, rat	LD50:1770 mg/kg, skn-rbt	USOS air: TWA 5 ppm (skn)	—
84	Aniline, N,N-dimethyl-p-nitroso-	000138896 (OMR DN1 &1)	65 rat	—	—	TDLo:7300 mg/kg/1Y, TFX:NEO, orl-rat
85	Aniline, 2,4-dinitro-	000097029 (WNR BZ ENW)	418 rat	LDLo:250 mg/kg, ipr-rat	—	—
86	Aniline, N-ethyl-	000103695	—	—	—	—
87	Aniline, N-ethyl-N-(2-hydroxyethyl)- (See Ethanol, 2-(N-ethylanilino)-					
88	Aniline, N-(2-hydroxyethyl)-N-methyl- (See Ethanol, 2-(N-methylanilino)-					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	45, 32	—	—	—	—	—
—	9c, 29	—	—	—	—	2)107
—	12, 29	—	—	—	—	2)107
—	19, 33	—	—	—	—	—
—	6,8,10, 17	—	—	1.495/1974	—	—
—	2b, 17	—	—	—	—	—
—	20, 33	—	—	—	—	2)107
—	19, 33	—	—	—	—	—
—	6,7,8, 10 18	—	—	8.803/1974	—	2)107
—	2c, 18	—	—	—	—	2)108
—	7e, 24	—	—	0.261/1974	—	2)109
—	2b, 17	—	—	1.088/1974	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
89	Aniline, 2-hydroxy-5-methyl-	—	—	—	—	—
90	Aniline, 2-methoxy-5-methyl-	001207181	—	—	—	—
91	Aniline, 2-methoxy-6-methyl-	050868730	—	—	—	—
92	Aniline, 4-methoxy-3-nitro-N-phenyl-	—	—	—	—	—
93	Aniline, N-methyl-	000100618 (1MR)	LDLo:280 mg/kg, orl-rbt	—	USOS air: TWA 2 ppm (skn)	—
94	Aniline, 4,4'-methylenebis-[N,N-diethyl-	000135911	—	—	—	—
95	Aniline, 4,4'-methylenebis-[N,N-dimethyl-	028213812 (1N1&R D- 21)	681 rat	—	—	—
96	Aniline, m-nitro-	000099092 (ZR CNW)	535 rat	LDLo:70 mg/kg, ipr-dog	—	—
97	Aniline, o-nitro	000088744 (ZR BNW)	535 rat	—	—	—
98	Aniline, p-nitro-	0001000016 (ZR DNW)	3249 rat	LDLo:40 mg/kg, ivn-mam	USOS air: TWA 1 ppm (skn)	—
99	Aniline sulfonic acid, ethylbenzyl (See m-Toluenesulfonic acid, -(N-ethylanilino)-)					
100	Aniline, 2,4,5-trichloro-	000636306	—	—	—	—
101	o-Anisic acid	000579759	—	Unknown probably low	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	15, 31	—	—	—	—	—
Reduction	15, 31	—	—	—	—	—
Reduction	14, 31	—	—	—	—	—
—	18, 32	—	—	—	—	—
—	2c, 18	—	—	—	—	2)110
—	6,7, 17	—	—	—	—	—
—	2c, 18	—	—	0.844/1974	—	2)110
—	25c, 45	—	—	—	—	2)111
—	2a, 16 7d, 23	Emission factors: NH_3 - 3.0, nitrobenzene - 1.0, NO_2 - 1.0, SO_2 - 1.0	—	—	—	2)111 12)
—	2a, 16 9c, 29	Emission factors: same as o-nitoaniline	—	—	—	2)111 12)
—	40, 63	—	—	—	—	—
—	36, 60	—	—	—	—	3)410

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
102	p-Anisic acid	0001000094	—	Unknown probably low	—	—
103	m-Anisidine	000536903	—	—	—	—
104	o-Anisidine	000090040	—	—	USOS air: TWA 0.1 ppm (skn) USOS air: TWA 0.5 mg/m^3 (skn)	—
105	p-Anisidine	000104949 (ZR DO1)	1400 rat	—	USOS air: TWA 0.1 ppm (skn) USOS air: TWA 0.5 mg/m^3 (skn)	—
106	o-Anisidine, 4-n-butylsulfonamido- (See Benzenesulfonamide, 3-amino-N-n-butyl-4-methoxy-)					
107	o-Anisidine, 4-chloro	000093505	—	—	—	—
108	o-Anisidine, 5-chloro-	000095034	—	—	—	—
109	p-Anisidine, 2-nitro-	000096968	—	—	—	—
110	p-Anisidine, 3-nitro-	000577720	—	—	—	—
111	o-Anisidine, 4-nitro-	000097529	—	—	—	—
112	o-Anisidine, 5-nitro-	000099592 (WNR CZ DO1)	704 rat	—	—	—
113	o-Anisidine, 5-nitro-N-ethyl-	—	—	—	—	—
114	p-Anisidine, 3-nitro-N-phenyl-	—	—	—	—	—
115	Anisole, 4-anilino-2-nitro- (See Aniline, 4-methoxy-3-nitro-N-phenyl-)					
116	Anisole, 5-n-butylsulfonamido-2-nitroanisole- (See Benzenesulfonamide, N-n-butyl-4-methoxy-3-nitro)					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	21, 34	—	—	—	—	3)410
—	25e, 45	—	—	—	—	—
—	7c, 22	—	—	—	—	2)113 3)410, 16
—	9a, 27	—	—	—	—	2)113 3)410, 16
—	25b, 44	—	—	—	—	—
—	18, 32	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	7c, 22	—	—	—	—	2)113
—	7e, 24	—	—	—	—	—
—	18, 32	—	—	—	—	—

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
117	Anisole, 4-chloro-2-nitro-	000089214	—	—	—	—
118	Anisole, 2,4-diamino- (See m-phenylenediamine, 4-methoxy-)					
119	Anisole, 4,5-dichloro-2-nitro- (See Benzene, 1,2-dichloro-4-methoxy-5-nitro)					
120	Anisole, 2,4-dinitro-	000119277 (WNR BO1 ENW)	LDLo:100 rat	—	—	—
121	Anisole, m-methyl-	000100845	—	—	—	—
122	Anisole, m-nitro-	000555033	—	—	—	—
123	Anisole, o-nitro-	000091236	—	—	—	—
124	Anisole, p-nitro-	000100174	4700 mam	—	—	—
125	p-Anisoyl chloride	000100072	—	—	—	—
126	p-Anisoyl chloride, 3-nitro-	010397281	—	—	—	—
127	2-Anthracenecarboxylic acid, 3-chloro-	000135477	—	—	—	—
128	2-Anthracenecarboxylic acid, 3-chloro-9,10-dihydro-9,10-dioxo-	—	—	—	—	—
129	2-Anthracenecarboxylic acid, 3-hydroxy-	006295449	—	—	—	—
130	9,10-Anthracenedione	000084651 (L C666 BV IVJ)	—	—	—	TDLo:90 gm/kg/ 90DC TFX:NEO orl-rat
131	9,10-Anthracenedione, 2-amino-	000082451 (L C666 BV IVJ D2)	—	—	—	TDLo:2440 mg/kg/ 61WI TFX:NEO

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	18, 32	—	—	—	—	—
—	7e, 24	—	—	—	—	2)167
—	14, 31	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	21, 34	—	—	—	—	3)410
—	23a, 34	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	34b, 53 34g, 58	—	—	—	—	—
—	34e, 52	—	—	—	—	2)116
—	34c, 54 34e, 56	—	—	0.318/1974	—	2)116

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
132	9,10-Anthracenedione, 2-amino-	000117793	—	—	—	—
133	9,10-Anthracenedione, 1-amino-2-bromo-4-p-toluidino-	034037462	—	—	—	—
134	9,10-Anthracenedione, 1-amino-2-chloro	000117077	—	—	—	—
135	9,10-Anthracenedione, 1-amino-5-chloro-	000117113	—	—	—	—
136	9,10-Anthracenedione, 1-amino-8-chloro-	000117099	—	—	—	—
137	9,10-Anthracenedione, 2-amino-3-chloro-	000084468	—	—	—	—
138	9,10-Anthracenedione, 1-amino-2-chloro-4-hydroxy-	002478673	—	—	—	—
139	9,10-Anthracenedione, 1-amino-2,4-dibromo-	000081492	—	—	—	—
140	9,10-Anthracenedione, 2-amino-1,3-dichloro-	006374761	—	—	—	—
141	9,10-Anthracenedione, 1-amino-2,4-dichloro-	013432321	—	—	—	—
142	9,10-Anthracenedione, 1-amino-2,4-dihydroxy-	000081516	—	—	—	—
143	9,10-Anthracenedione, 2-amino-3-hydroxy-	000117771	—	—	—	—
144	9,10-Anthracenedione, 1-amino-2-methyl-	000082280	—	—	—	—
145	9,10-Anthracenedione, 1-amino-4-nitro-	006937742	—	—	—	—
146	9,10-Anthracenedione, 1-amino-5-nitro-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	28, 58	—	—	—	—	—
—	15,28, 59	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	28, 55	—	—	—	—	—
—	34, 55	—	—	—	—	—
—	28, 52	—	—	—	—	—
—	34h, 59	—	—	—	—	—
—	12, 59	—	—	0.389/1974	—	—
—	12, 58	—	—	—	—	—
—	12, 59	—	—	—	—	—
—	28, 58	—	—	—	—	—
—	36, 52	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	28, 56,59	—	—	—	—	—
—	28, 54	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
147	9,10-Anthracenedione, 1-bromo-	000632837	—	—	—	—
148	9,10-Anthracenedione, 1-bromo-4-hydroxy-	—	—	—	—	—
149	9,10-Anthracenedione, 1-bromo-4-methylamino-	000128938	—	—	—	—
150	9,10-Anthracenedione, 1-chloro-	000082440	—	—	—	—
151	9,10-Anthracenedione, 2-chloro-	000131099	—	—	—	—
152	9,10-Anthracenedione, 1-chloro-4-hydroxy-	000082428	—	—	—	—
153	9,10-Anthracenedione, 1-chloro-2-methyl-	000129351	—	—	—	—
154	9,10-Anthracenedione, 1-chloro-4-nitro-	006337822	—	—	—	—
155	9,10-Anthracenedione, 1-chloro-5-nitro-	000129408	—	—	—	—
156	9,10-Anthracenedione, 1-chloro-8-nitro-	000129384	—	—	—	—
157	9,10-Anthracenedione, 1,5-diamino-	000129442	—	—	—	—
158	9,10-Anthracenedione, 1,8-diamino-	000129420	—	—	—	—
159	9,10-Anthracenedione, 1,5-diamino-4,8-dihydroxy-	000145493 (L C666 BV IVJ DZ GQ KZ NQ)	—	LDLo:256 mg/kg, ipr-mus	—	—
160	9,10-Anthracenedione, 1,2-dichloro-	001594463	—	—	—	—
161	9,10-Anthracenedione, 1,5-dichloro-	000082462	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34e, 56	—	—	—	—	—
—	12, 57	—	—	—	—	—
—	12, 56	—	—	—	—	—
—	28, 56	—	—	—	—	—
—	28, 58	—	—	—	—	—
—	12, 57	—	—	—	—	—
—	25, 53	—	—	—	—	—
—	34e, 56	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	28, 32, 54,55	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	34d, 55	—	—	—	—	2)115
—	34a, 52	—	—	—	—	—
—	34d, 55	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
162	9,10-Anthracenedione, 1,8-dichloro-	000082439	—	—	—	—
163	9,10-Anthracenedione, 2,3-dichloro-	000084457	—	—	—	—
164	9,10-Anthracenedione, 1,2-dihydroxy-	000072480	—	—	—	—
165	9,10-Anthracenedione, 1,5-dihydroxy-	000117124	—	—	—	—
166	9,10-Anthracenedione, 1,8-dihydroxy-	000117102 (L C666 BV IVJ DQ NQ)	—	LDLo:500 mg/kg, ipr-rat	—	—
167	9,10-Anthracenedione, 2,6-dihydroxy-	000084605	—	—	—	—
168	9,10-Anthracenedione, 1,5-dihydroxy-4,8-dinitro-	000128916	—	—	—	—
169	9,10-Anthracenedione, 1,5-dimethoxy-	006448904	—	—	—	—
170	9,10-Anthracenedione, 1,5-dimethoxy-4,8-dinitro-	—	—	—	—	—
171	9,10-Anthracenedione, 1,5-dinitro-	000082359	—	—	—	—
172	9,10-Anthracenedione, 1,8-dinitro-	000129395	—	—	—	—
173	9,10-Anthracenedione, 1,5-diphenoxy-	000082213	—	—	—	—
174	9,10-Anthracenedione, 1-hydrazino-2-methyl-	—	—	—	—	—
175	9,10-Anthracenedione, 1-hydroxy-	000129431	—	—	—	—
176	9,10-Anthracenedione, 1-hydroxy-4-nitro-	000081652	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34d, 55	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	23,58	—	—	—	—	—
—	33,15, 58,55	—	—	—	—	—
—	34d, 55	—	—	—	—	2)116
—	34g, 58	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	28, 54	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	34f, 57	—	—	—	—	—
—	34f, 57	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
177	9,10-Anthracenedione, 1-methoxy-	000082393	—	—	—	—
178	9,10-Anthracenedione, 2,methyl-	000084548	—	—	—	—
179	9,10-Anthracenedione, 1-methlamino-	000082382	—	—	—	—
180	9,10-Anthracenedione, 1-(methlamino)-4-[(4-methylphenyl)amino]-	000128858	—	—	—	—
181	9,10-Anthracenedione, 2-methyl-1-nitro-	000129157	—	—	—	—
182	9,10-Anthracenedione, 1-nitro-	000082348	—	—	—	—
183	9,10-Anthracenedione, 1,4,5,8-tetrachloro-	000081583	—	—	—	—
184	9,10-Anthracenedione, 1-(4-tolysulfonamido)-2-chloro-	—	—	—	—	—
185	9,10-Anthracenedione, 1,2,4-trihydroxy-	000081549	—	—	—	—
186	1,5-Anthracenedisulfonic acid, 9,10-dihydro-9,10-dioxo-	000117146	—	—	—	—
187	1,8-Anthracenedisulfonic acid, 9,10-dihydro-9,10-dioxo-	000082484	—	—	—	—
188	2,6-Anthracenedisulfonic acid, 4,8-diamino-9,10-dihydro-1,5-dihydroxy-9,10-dioxo-	000128869	—	—	—	—
189	2,6-Anthracenedisulfonic acid, 9,10-dihydro-1,5-dihydroxy-9,10-dioxo-	006492859	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34e, 56	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	28, 56	—	—	—	—	—
—	28, 56	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	12,39, 54	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	34g, 58	—	—	—	—	—
Sulfonation	15, 55	—	—	—	—	—
—	15, 55	—	—	—	—	—
—	33, 55 58	—	—	—	—	—
—	33, 55 15, 58	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
190	2,6-Anthracenedisulfonic acid, 9,10-dihydro-1,5-dihydroxy-4,8-dinitro-9,10-dioxo-	—	—	—	—	—
191	2,6-Anthracenedisulfonic acid, 9,10-dihydro-9,10-dioxo-	000084504	—	—	—	—
192	1-Anthracenesulfonic acid, 9,10-dihydro-9,10-dioxo-	000082495	—	—	—	—
193	1-Anthracenesulfonic acid, 9,10-dihydro-5-nitro-9,10-dioxo-	000082508	—	—	—	—
194	1-Anthracenesulfonic acid, 9,10-dihydro-8-nitro-9,10-dioxo-	000129373	—	—	—	—
195	2-Anthracenesulfonic acid	015100535	—	—	—	—
196	2-Anthracenesulfonic acid, 1-amino-4-(3-amino-4-sulfo-anilino)-9,10-dihydro-9,10-dioxo-	000128994	—	—	—	—
197	2-Anthracenesulfonic acid, 1-amino-4-(4-amino-3-sulfo-anilino)-9,10-dihydro-9,10-dioxo-	000081696	—	—	—	—
198	2-Anthracenesulfonic acid, 1-amino-4-bromo-9,10-dihydro-9,10-dioxo-	000116814	—	—	—	—
199	2-Anthracenesulfonic acid, 1-amino-9,10-dihydro-9,10-dioxo-	000083625	—	—	—	—
200	2-Anthracenesulfonic acid, 3-amino-9,10-dihydro-9,10-dioxo-	033016692	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	33, 55 58	—	—	—	—	—
—	15, 58	—	—	—	—	—
—	34c, 54	—	—	0.518/1974	—	—
—	34d, 55	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34g, 58	—	—	—	—	—
—	34h, 59	—	—	—	—	—
—	34h, 59	—	—	—	—	—
—	12, 59	—	—	—	—	—
—	15, 59	—	—	—	—	—
—	15, 58	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
201	2-Anthracenesulfonic acid, 1-amino-9,10-dihydro-4-(3-nitro-4-sulfoanilino)-9,10-dioxo-	—	—	—	—	—
202	2-Anthracenesulfonic acid, 1-amino-9,10-dihydro-4-(4-nitro-3-sulfoanilino)-9,10-dioxo-	—	—	—	—	—
203	2-Anthracenesulfonic acid, 9,10-dihydro-9,10-dioxo-	00084480	—	—	—	—
204	2-Anthracenol	000613149	—	—	—	—
205	Anthranilic acid, N-(4-amino-1-anthraquinonyl)-	—	—	—	—	—
206	Anthranilic acid, N-[(3-carboxy-4-chlorobenzene)-sulfonyl]	—	—	—	—	—
207	Anthranilic acid, N-carboxy methyl-	000612420	—	—	—	—
208	Anthranilic acid, 4-chloro-	000089770	—	—	—	—
209	Anthranilic acid, N-methyl	000119686	—	—	—	—
210	Anthranilic acid, N-(4-nitro-1-anthraquinonyl)-	—	—	—	—	—
211	Anthranilic acid, 4-sulfo-	000098431	—	—	—	—
212	Anthranilic acid, 5-sulfo-	025352276	—	—	—	—
213	Anthraquinone, 1-acetamido-4-bromo-N-methyl-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34h, 59	—	—	—	—	—
—	34h, 59	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	34g, 58	—	—	—	—	—
Reduction	34e, 56	—	—	—	—	—
—	10, 30	—	—	—	—	—
—	5, 19	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	5, 19	—	—	—	—	—
—	28, 56	—	—	—	—	—
—	38, 61	—	—	—	—	—
—	5, 19	—	—	—	—	—
—	34e, 56	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
214	Anthraquinone, 1-acetamido-N-methyl-4-p-toluidino-	—	—	—	—	—
215	Anthraquinone, 1-amino-4-anilino-2-bromo-	—	—	—	—	—
216	Anthraquinone, 2-amino-1-bromo-3-chloro-	—	—	—	—	—
217	Anthraquinone, 2-amino-1,3-dibromo-	—	—	—	—	—
218	Anthraquinone, 1,5-bis(dinitrophenoxy)-4,8-dinitro-	—	—	—	—	—
219	Anthraquinone, 1-hydrazino-2-methyl (See 9,10-Anthracenedione, 1-hydrazine-2-methyl-)					
220	Anthraquinone, 1,4,5,8-tetrahydroxy-	000081607	—	—	—	—
221	2-Anthronic acid, 9,10-dihydro-1-nitro-9,10-dioxo-	000128676 (L C666 BV IVJ DNW EVQ)	LDLo:2000 mg/kg, rat	—	—	—
222	9-Anthrol	000529862	—	—	—	—
223	20Anthro-o-toluidide, 3-hydroxy-	001830779	—	—	—	—
224	2-Anthroylchloride, 9,10-dihydro-1-nitro-9,10-dioxo-	—	—	—	—	—
225	Azobenzene	000103333 (RNUNR)	1000 rat	LDLo:50 mg/kg, unk-mam	—	TDLo:17 gm/kg/2YI TFX:NEO scu-rat
226	Azoxybenzene	000495487 (ONR&UNR)	620 rat	Limited animal experiments show moderate toxicity	—	TDLo:4 mg/kg TFX:CDR scu-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34e, 56	—	—	—	—	—
—	28, 59	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	12, 58	—	—	—	—	—
—	34d, 55	—	—	—	—	—
—	34g, 58	—	—	—	—	—
—	34b, 53	—	—	—	—	2)117
—	26, 54	—	—	—	—	—
—	29a, 48 34g, 58 34b, 53	—	—	—	—	—
—	34b, 53	—	—	—	—	—
—	25a, 43	—	—	—	—	2)138 3)427
—	25a, 43	—	—	—	—	2)140 3)428

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
227	Benzaldehyde, 4[N-n-butyl-N-(2-chloroethyl)amino]-	—	—	—	—	—
228	Benzaldehyde, o-chloro-	000089985 (VHR BG)	—	LDLo:10 mg/kg, ipr-mus	—	—
229	Benzaldehyde, p-[(2-chloroethyl)-methylamino]-	000094315	—	—	—	—
230	Benzaldehyde, 4-[(2-chloroethyl) ethylamino]	002643074	—	—	—	—
231	Benzaldehyde, p-(diethylamino)	000120218	—	—	—	—
232	Benzaldehyde, p-dimethylamino	000100107 (VHR DN1&1)	—	LD50:620 mg/kg, ipr-rat	—	—
233	Benzaldehyde, m-nitro-	000091616	—	—	—	—
234	Benzaldehyde, p-nitro-	000555168 (WNR DVH)	—	LD50:545 mg/kg, ipr-rat	—	—
235	Benzamide, N-(4-amino-1-anthraquinonyl)	000081469	—	—	—	—
236	Benzamide, N-(4-amino-9,10-dihydro-9,10-dioxo-1-anthracenyl)-	000081469	—	—	—	—
237	Benzamide, N-(5-amino-9,10-dihydro-9,10-dioxo-1-anthracenyl)-	000117066	—	—	—	—
238	Benzamide, 4-amino-N-ethyl-N-1-naphthyl-	—	—	—	—	—
239	Benzamide, p-amino-N-[7-(4-hydroxy-2-naphthalenesulfonic acid)	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	9, 17	—	—	—	—	—
—	6, 62	—	—	—	—	2)154
—	9, 18	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	6,8, 17	—	—	—	—	—
—	2c, 18	—	—	0.007/1974	—	2)154
—	5, 19	—	—	—	—	—
—	30, 50	—	—	—	—	2)155
Reduction	37, 59	—	—	—	—	—
—	37, 59 56	—	—	0.019/1974	—	—
—	34c, 54	—	—	—	—	—
Reduction	23a, 34	—	—	—	—	—
Reduction	5, 19 23i, 42	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
240	Benzamide, 3-amino-4-methoxy-	017481275	—	—	—	—
241	Benzamide, N-(4-amino-5-methoxy-2-methylphenyl)-	—	—	—	—	—
242	Benzamide, N-1-anthraquinonyl-	—	—	—	—	—
243	Benzamide, N-(5-anthraquinonyl-1-nitro)-	—	—	—	—	—
244	Benzamide, 3-chloro-N- (p-chlorophenyl)	010286756	—	—	—	—
245	Benzamide, N-(4-chloro-1-anthraquinonyl)	000081458	—	—	—	—
246	Benzamide, N-(9,10-dihydro 9,10-dioxo-4-nitro-1-anthracenyl)-	—	—	—	—	—
247	Benzamide, N-ethyl-N-1-naphthyl-p-nitro-	—	—	—	—	—
248	Benzamide, N-[4-(5-hydroxy-2,7-naphthalene-disulfonic acid)]	000117464	—	—	—	—
249	Benzamide, N-(4-methoxy-2-methyl-5-nitrophenyl)	—	—	—	—	—
250	Benzamide, 4-methoxy-3-nitro-	—	—	—	—	—
251	Benzamide, N-[4-(2-nitrobenzenesulfonic acid)	—	—	—	—	—
252	Benzamide, p-nitro-N-[7-(4-hydroxy-2-naphthalene sulfonic acid)]	—	—	—	—	—
253	Benzanilide, 4'-amino-	017625831	—	—	—	—
254	Benzanilide, 4'-amino-2',5'-diethoxy-	000120003	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	21, 34	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	12,31, 59	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	12, 30	—	—	—	—	—
Chlorination	12, 56 59	—	—	—	—	—
—	34e, 56 34h, 59	—	—	—	—	—
—	23a, 34	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	21, 34	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	23i, 42	—	—	—	—	—
—	9c, 29	—	—	—	—	—
—	19, 33	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
255	Benzanilide, 4'-amino-2',5'-dimethoxy-	062680509	—	—	—	—
256	Benzanilide, 3'-amino-4'-sulfo-	—	—	—	—	—
257	Benzanilide, 3,3'-diamino-	000101122	—	—	—	—
258	Benzanilide, 2',5'-diethoxy-	—	—	—	—	—
259	Benzanilide, 2',5'-diethoxy-4'-nitro-	—	—	—	—	—
260	Benzanilide, 2',5'-dimethoxy-	—	—	—	—	—
261	Benzanilide, 2',5'-dimethoxy-4'-nitro	—	—	—	—	—
262	Benzanilide, 3,3'-dinitro	000101246	—	—	—	—
263	Benzanilide, 4'-nitro-	003393962	—	—	—	—
264	7H-Benz[de]anthracen-7-one (Benzanthrone)	000082053 (L C6666 1A Q IVJ)	—	LDLo:1000 mg/kg, ipr-mus	—	—
265	7H-Benz[de]anthracen-7-one, 3-amino-	013456809	—	—	—	—
266	7H-Benz[de]anthracen-7-one, 3-amino-2-nitro-	050607200	—	—	—	—
267	7H-Benz[de]anthracen-7-one, 3-benzoyl-	—	—	—	—	—
268	7H-Benz[de]anthracen-7-one, 3-bromo-	000081969	—	—	—	—
269	7H-Benz[de]anthracen-7-one, 3-chloro-	006409445	—	—	—	—
270	7H-Benz[de]anthracen-7-one, 3,9-dibromo-	000081981	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	19, 33	—	—	—	—	—
Reduction	25c, 45	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	9c, 29	—	—	—	—	—
—	26, 54	—	—	0.380/1974	—	2)161 3)440
—	34c, 54	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	26, 54	—	—	—	—	—
—	12,34, 54	—	—	0.380/1974	—	—
—	12, 54	—	—	—	—	—
—	12, 54	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
271	7H-Benz[de]anthracen-7-one, 3,9-dichloro-	—	—	—	—	—
272	7H-Benz[de]anthracen-7-one, 2-hydroxy-	—	—	—	—	—
273	7H-Benz[de]anthracen-7-one, 2-methoxy	006535677	—	—	—	—
274	Benzenamine derivatives, (See Aniline derivatives)					
275	Benzene, 1-chloro-2,4-dimethoxy-5-nitro-	000119211	—	—	—	—
276	Benzene, 1-chloro-2,5-dimethoxy-4-nitro-	006940530	—	—	—	—
277	Benzene, 1-chloro-2,4-dinitro-	000097007 (WNR BG ENW)	1070 rat	—	—	—
278	Benzene, 1-chloro-2-nitro-	000088733	288 rat	—	—	—
279	Benzene, 1-chloro-3-nitro-	000121733	—	TCLo:12 ug/m^3 TFX:EYE, ihl-hmn	—	—
280	Benzene, 1-chloro-4-nitro-	000100005 (WNR DG)	1414 mus	—	USOS air: TWA 1 mg/m^3 (skn)	—
281	Benzene, m-dichloro-	000541731	—	—	—	—
282	Benzene, 1,2-dichloro-4-nitro-	—	—	—	—	—
283	Benzene, 1,2-dichloro-4-nitro-	000099547	—	—	—	—
284	Benzene, 1,4-dichloro-2-nitro-	000089612	—	—	—	—
285	Benzene, 2,4-dichloro-1-nitro-	000611063	—	—	—	—
286	Benzene, p-diethoxy-	000122952	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	12, 54	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	34c, 54	—	—	—	—	—
—	40, 63	—	—	—	—	—
—	19, 33	—	—	—	—	—
—	3, 30	—	—	—	—	2)165
—	7a, 30	—	—	—	—	2)165
—	25a, 43	—	—	—	—	—
—	7a, 20	—	—	—	—	2)165
—	25b, 44	—	—	—	—	—
—	40, 63	—	—	—	—	—
—	12, 29	—	—	—	—	—
—	18, 32	—	—	—	—	—
—	25b, 44	—	—	—	—	—
—	19, 33	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
287	Benzene, 1,4-diethoxy-2-nitro-	—	—	—	—	—
288	Benzene, *p*-dimethoxy-	000150787 (1OR DO1)	—	LDLo:300 mg/kg, ipr-mus LD50:1100 mg/kg, ipr-rat	—	—
289	Benzene, 1,4-dimethoxy-1-nitro-	000089394	—	—	—	—
290	Benzene, 2,4-dimethyl-1-nitro-	000089872	—	—	—	—
291	Benzene, *m*-dinitro	000099650 (WNR CNW)	42 bdw LDLo:29 mg/kg, cat	—	USOS air: TWA 1 mg/m^3 (skn)	—
292	*p*-Benzenedisulfonic acid, 2-amino-	000098442	—	—	—	—
293	1,3-Benzenedisulfonic acid, 5-amino-4-hydroxy-	000120989	—	—	—	—
294	1,3-Benzenedisulfonic acid, 4,5-diamino-	000137508	—	—	—	—
295	*m*-Benzenedisulfonic acid, 4-formyl-	000088391	—	—	—	—
296	*m*-Benzenedisulfonic acid, 4-hydroxy-	000096775	—	—	—	—
297	1,3-Benzenedisulfonic acid, 4-hydroxy-5-nitro-	—	—	—	—	—
298	*p*-Benzenedisulfonic acid, 2-nitro-	000119006	—	—	—	—
299	Benzenesulfinic acid, *p*-chloro-	000100038	—	—	—	—
300	Benzenesulfinic acid, 2-chloro-5-nitro-	—	—	—	—	—
301	Benzenesulfonamide, 3-amino-N-*n*-butyl-4-methoxy-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	20, 33	—	—	—	—	—
—	19, 33	—	—	—	—	2)166
—	19, 33	—	—	—	—	—
—	42, 63	—	—	—	—	—
—	25c, 45	—	—	—	—	2)166
—	8a, 25	—	—	—	—	—
—	32, 51	—	—	—	—	—
—	15, 45	—	—	—	—	—
—	11, 61	—	—	—	—	—
—	32, 51	—	—	—	—	—
—	32, 51	—	—	—	—	—
—	8a, 25	—	—	—	—	—
—	7a, 20	—	—	—	—	—
—	9a, 27	—	—	—	—	—
Reduction	8a, 25	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
302	Benzenesulfonamide, 4'-amino-2',5'-dimethoxy-N-phenyl-	052298449	—	—	—	—
303	Benzenesulfonamide, 3-amino-4-hydroxy-N-methyl-	000080239	—	—	—	—
304	Benzenesulfonamide, N-n-butyl-4-methoxy-3-nitro-	—	—	—	—	—
305	Benzenesulonamide, p-chloro-	000098646 (ZSWR DG)	LDLo:500 mg/kg, rat	—	—	—
306	Benzensulfonamide, 4-chloro-N-N-dimethyl-3-nitro-	000137473	—	—	—	—
307	Benzenesulfonamide, 4-chloro-N-methyl-3-nitro-	000137484	—	—	—	—
308	Benzenesulonamide, 4-chloro-3-nitro-	000097096	—	—	—	—
309	Benzenesulfonamide, N-(2,5-dimethoxy-4-nitro phenyl)-	—	—	—	—	—
310	Benzenesulfonamide, N-(2,5-dimethoxyphenyl)-	034238374	—	—	—	—
311	Benzenesulfonamide, 4-hydroxy-N-methyl-3-nitro-	—	—	—	—	—
312	Benzenesulfonanilide, 2-amino-N-ethyl-5-nitro-	—	—	—	—	—
313	Benzenesulfonanilide, 4-chloro-3-nitro-	000137495	—	—	—	—
314	Benzenesulfonate, 8-amino-3-, 6-disulfo-1-naphthyl-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	20, 33	—	—	—	—	—
—	26, 46	—	—	—	—	—
—	8a, 25	—	—	—	—	—
—	7a, 20	—	—	—	—	2)169
—	7b, 21	—	—	—	—	—
—	7b, 21	—	—	—	—	—
—	7b, 21	—	—	0.367/1974	—	—
—	20, 33	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	26, 46	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	7b, 21	—	—	—	—	—
—	23c, 36	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
315	Benzenesulfonic acid, 3-acetylamino-	—	—	—	—	—
316	Benzenesulfonic acid, 5-(acetylamino)-2-amino	000096786	—	—	—	—
317	Benzenesulfonic acid, 5-acetamido-2-amino-4-methoxy-	—	—	—	—	—
318	Benzenesulfonic acid, m-amino-(metanilic acid)	000121471	—	—	—	—
319	Benzensulfonic acid, 2-amino(orthanilic acid)	000088211	—	—	—	—
320	Benzenesulfonic acid, 5-amino-2[4-(aminophenyl) amino]-	000119700	—	—	—	—
321	Benzenesulfonic acid, 5-amino-2-anilino	000091305	—	—	—	—
322	Benzenesulfonic acid, 2-(p-amino-anilino)-5-nitro-	014846083	—	—	—	—
323	Benzenesulfonic acid, 2-amino-4-(benzoylamino)-	029452720	—	—	—	—
324	Benzenesulfonic acid, 2-[(4-amino-3-bromo-9,10-dihydro-9,10-dioxo-1-anthracenyl)amino-5-methyl-	004988323	—	—	—	—
325	Benzenesulfonic acid, 2-amino-5-chloro-	000133744	—	—	—	—
326	Benzenesulfonic acid, 3-amino-4-chloro-	000098362	—	—	—	—
327	Benzenesulfonic acid, 4-amino-2-chloro-5-hydroxy-	—	—	—	—	—
328	Benzenesulfonic acid, 2-amino-4',5-(diazo) di-, disodium salt	002706287	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	25a, 43	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	8b, 26	—	—	—	—	—
—	5, 19 25a, 43	—	—	0.591/1974	—	—
—	7b, 21 5, 19	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	20, 28	—	—	—	—	—
—	20, 28	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	34h, 59	—	—	—	—	—
—	9a, 27	—	—	—	—	—
Reduction	8a, 25	—	—	—	—	—
—	15, 32	—	—	—	—	—
—	4, 16	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
329	Benzenesulfonic acid, 2-amino-4,5-dichloro-	—	—	—	—	—
330	Benzenesulfonic acid, 3-amino-4-hydroxy-	000098373	—	—	—	—
331	Benzenesulfonic acid, 3-amino-2-hydroxy-5-nitro-	—	—	—	—	—
332	Benzenesulfonic acid, 2-amino-5-methoxy-	013244332	—	—	—	—
333	Benzenesulfonic acid, 2-amino-5-methoxy-	000098420	—	—	—	—
334	Benzenesulfonic acid, 5-amino-4-methoxy-2-nitro-	—	—	—	—	—
335	Benzenesulfonic acid, 2-amino-5-nitro-	000096753	—	—	—	—
336	Benzenesulfonic acid, 4-amino-2-nitro-	000712243	—	—	—	—
337	Benzenesulfonic acid, p-[(p-aminophenyl)azo]-	000104234	—	—	—	—
338	Benzenesulfonic acid, 5-amino-2-(p-toluidino)-	—	—	—	—	—
339	Benzensulfonic acid, 3-(amino-4-tosyl)-4-methoxy- (See Benzenesulfonic acid, 4-methoxy-3-(p-toluenesulfonamido)-					
340	Benzenesulfonic acid, 2-anilino-5-nitro-	000088357	—	—	—	—
341	Benzenesulfonic acid, 2-o-anisidino-5-nitro-	—	—	—	—	—
342	Benzenesulfonic acid, 4-chloro-3,5-diamino-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	17, 31	—	—	—	—	—
—	8a, 25	—	—	—	—	—
Partial Reduction	9b, 28	—	—	—	—	—
—	15, 27	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	7c, 22 8b, 26	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	4, 16	—	—	0.197/1974	13	—
Reduction	9b, 28	—	—	—	—	—
—	3, 28	—	—	—	—	—
—	3, 28	—	—	—	—	—
Reduction	8a, 25	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
343	Benzenesulfonic acid, 2-chloro-3,5-dinitro-	004515268	1640 rat	—	—	—
344	Benzenesulfonic acid, 3-chloro-4,6-dinitro-	—	—	—	—	—
345	Benzenesulfonic acid, 4-chloro-3,5-dinitro-	038185067	—	—	—	—
346	Benzenesulfonic acid, 4-chloro-3-hydrazino-	—	—	—	—	—
347	Benzenesulfonic acid, 5-chloro-2-hydraxino-	—	—	—	—	—
348	Benzenesulfonic acid, 5-chloro-4-methyl-2-nitro-	006973133	—	—	—	—
349	Benzenesulfonic acid, *p*-chloro-3-(3-methyl-5-oxo-2-pyrazolin-1-yl)-	—	—	—	—	—
350	Benzenesulfonic acid, *m*-chloro-6-(3-methyl-5-oxo-2-pyrazolin-1-yl)-	—	—	—	—	—
351	Benzenesulfonic acid, 4-chloro-3-nitro-	000121186	—	—	—	—
352	Benzenesulfonic acid, 2-chloro-5-nitro-	000096731	—	—	—	—
353	Benzenesulfonic acid, 2,4-diamino-	000088631	—	—	—	—
354	Benzenesulfonic acid, 2,5-diamino-	000088459	—	—	—	—
355	Benzenesulfonic acid, 2,5-diamino-4-methoxy-	—	—	—	—	—
356	Benzenesulfonic acid, 3,4-dichloro-	000939957	—	—	—	—
357	Benzenesulfonic acid, 2,5-dichloro-4-hydrazino-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	9b, 28	—	—	—	—	2)170
—	12, 24	—	—	—	—	—
—	4, 25	—	—	—	—	—
—	4, 25	—	—	—	—	—
Reduction	4, 27	—	—	—	—	—
—	39, 62	—	—	—	—	—
—	4, 25	—	—	—	—	—
—	4, 29	—	—	—	—	—
—	15, 23 25	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	7e, 24	—	—	—	—	—
—	9b, 28	—	—	—	—	—
Reduction	8b, 26	—	—	—	—	—
—	15, 31	—	—	—	—	—
Reduction	4, 32	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
358	Benzenesulfonic acid, 2,5-dichloro-4-(3-methyl-5-oxo-2-pyrazolin-1-yl)-	000084571	—	—	—	—
359	Benzenesulfonic acid, 4,5-dichloro-2-nitro-	—	—	—	—	—
360	Benzenesulfonic acid, 2,4-dinitro-	000089021	—	—	—	—
361	Benzenesulfonic acid, 3,5-dinitro-2-hydroxy-	—	—	—	—	—
362	Benzenesulfonic acid, 4-(N-ethylanilinonethane) (See M-Toluenesulfonic acid, -(N-ethylanilino)					
363	Benzenesulfonic acid, o-formyl-	000091258	—	—	—	—
364	Benzenesulfonic acid, p-hydrazino-	000098715	—	—	—	—
365	Benzenesulfonic acid, 4-hydroxy-3,5-dinitro-	—	—	—	—	—
366	Benzenesulfonic acid, 4-hydroxy-3-nitro-	000616853	—	—	—	—
367	Benzenesulfonic acid, 4-methoxy-3-nitro-	022117813	—	—	—	—
368	Benzenesulfonic acid, 4-methoxy-3-(p-toluenesulfonamido)-	—	—	—	—	—
369	Benzenesulfonic acid, 4-methyl-3-nitro-	000097063	—	—	—	—
370	Benzenesulfonic acid, p-(3-methyl-5-oxo-2-pyrazolin-1-yl)-	000089361	—	—	—	—
371	Benzenesulfonic acid, m-nitro-	000098475	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	4, 32	—	—	—	—	—
—	17, 31	—	—	—	—	—
—	7e, 24	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	39, 62	—	—	—	—	—
—	2a, 16	—	—	—	—	—
—	8a, 25	—	—	—	—	—
—	8a, 25 32, 51	—	—	—	—	—
—	15, 25 22	—	—	—	—	—
—	8b, 26	—	—	—	—	—
—	38, 61	—	—	—	—	—
—	4, 16	—	—	—	—	—
—	25a, 43 5, 19	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
372	Benzenesulfonic acid, o-nitro-	000080820	—	—	—	—
373	Benzenesulfonic acid, 5-nitro-2-(p-nitroanilino)-	—	—	—	—	—
374	Benzenesulfonic acid, 5-nitro-2-(p-toluidine)-	—	—	—	—	—
375	Benzenesulfonic acid, 5,5′-ureylenebis-(2-amino-	—	—	—	—	—
376	Benzenesulfonic acid, 5,5′-ureylenebis[2-amino-4-methoxy-	—	—	—	—	—
377	Benzenesulfonic acid, 5,5′-ureylenebis[4-methoxy-2-nitro-	—	—	—	—	—
378	Benzenesulfonic acid, 5,5′-ureylenebis[2-nitro-	—	—	—	—	—
379	Benzenesulfonyl chloride, 2-amino-5-nitro-	020628335	—	—	—	—
380	Benzenesulfonyl chloride, p-chloro-	000098602 (WSGR DG)	4250 rat	—	—	—
381	Benzenesulfonyl chloride, 4-chloro-2-methyl-	—	—	—	—	—
382	Benzenesulfonyl chloride, 2-chloro-5-nitro-	004533953	—	—	—	—
383	Benzenesulfonyl chloride, 4-chloro-2-nitro-	004533964	—	—	—	—
384	Benzenesulfonyl chloride, 4-chloro-3-nitro-	000097085	—	—	—	—
385	Benzenesulfonyl chloride, 4-hydroxy-3-nitro-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	7b, 21	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	9b, 28	—	—	—	—	—
Reduction	25a, 43	—	—	—	—	—
Ditto	7c, 22	—	—	—	—	—
—	8, 22	—	—	—	—	—
—	25a, 43	—	—	—	—	—
—	9b, 28	—	—	—	—	—
—	7a, 20	—	—	—	—	2)171
—	28, 47	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	7a, 20	—	—	—	—	—
—	7b, 21	—	—	—	—	—
—	26, 46	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
386	Benzenesulfonyl chloride, 4-methoxy-3-nitro-	022117799	—	—	—	—
387	1,2,4-Benzenefricarboxylic acid, 5-amino	—	—	—	—	—
388	1,2,4-Benzenetricarboxylic acid, 5-amino	—	—	—	—	—
389	1,2,4-Benzenetricarboxylic acid, 5-nitro-	—	—	—	—	—
390	Benzene, 1,2,4-trichloro-5-nitro-	000089690 (WNR BG DG EG)	100 bdw	—	—	—
391	11H-Benzo[a] carbazole-30carbox-p-anisidide, 2-hydroxy-	000086191	—	—	—	—
392	11H-Benzo[a] carbazole-3-carboxylic acid, 2-hydroxy-	000084435	—	—	—	—
393	Benzoic acid, 5-amino-2-chloro-4-sulfo-	005855787	—	—	—	—
394	Benzoic, 2-(3-amino-4-hydroxybenzoyl)-	041378341	—	—	—	—
395	Benzoic acid, p-amino-[7-(4-hydroxy-2-naphthalenesulfonic acid)]	—	—	—	—	—
396	Benzoic acid, 4-(aminosulfonyl)-2-chloro-	053250843	—	—	—	—
397	Benzoic acid, o-benzoyl-	000085529	—	LDLo:32 mg/kg mus	—	—
398	Benzoic acid, 2-(4-carboxy-3-chloro-benzoyl)-	—	—	—	—	—
399	Benzoic acid, o-(carboxymethyl)-thio-	000135137	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	8a, 25	—	—	—	—	—
Reduction	41, 63	—	—	—	—	—
—	11, 63	—	—	—	—	—
—	41, 63	—	—	—	—	—
—	40, 63	—	—	—	—	2)172
—	23f, 39	—	—	—	—	—
—	23f, 39	—	—	—	—	—
Reduction	39, 62	—	—	—	—	—
Ditto	34a, 52	—	—	—	—	—
—	23h, 41	—	—	—	—	—
—	39, 62	—	—	—	—	—
—	34a, 52	—	—	—	—	2)183
Oxidation	34b, 53	—	—	—	—	—
—	43, 19	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
400	Benzoic acid, o-(p-chlorobenzoyl)-	000085563	—	—	—	—
401	Benzoic acid, 2-chloro-5-chlorosulfonyl-	000137644	—	—	—	—
402	Benzoic acid, 4-chloro-3,5-dinitro-	000118978	—	—	—	—
403	Benzoic acid, 2-chloro-5-nitro-	002516963	—	—	—	—
404	Benzoic acid, o-(4-chloro-3-nitrobenzoyl)-	00085541	—	—	—	—
405	Benzoic acid, 2-chloro-5-nitro-4-sulfo-	—	—	—	—	—
406	Benzoic acid, o-(3-chloro-p-toluoyl)-	015254270	—	—	—	—
407	Benzoic acid, 2,5-dichloro-	000050793 (QVR BG EG)	—	LD50:1200 mg/kg, scu-mus	—	—
408	Benzoic acid, 2-(2,3-dichlorobenzoyl)-	—	—	—	—	—
409	Benzoic acid, 2,2'-dithiodi-	000119802	—	—	—	—
410	Benzoic acid, 2-[3-ethyl-1-(4-methyl-3-nitrophenyl)triazenyl]-5-sulfo-	—	—	—	—	—
411	Benzoic acid, 2-(4-hydroxy-3-nitrobenzoyl)-	043046975	—	—	—	—
412	Benzoic acid, o-mercapto-	000147933	—	—	—	—
413	Benzoic acid, 4-methoxy-3-nitro-	000089418	—	—	—	—
414	Benzoic acid, m-nitro-	000121926	—	LD50:670 mg/kg, ipr-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34a, 52	—	—	—	—	—
—	10, 30	—	—	—	—	—
—	3, 30	—	—	—	—	—
—	10, 30	—	—	—	—	—
—	34a, 52	—	—	—	—	—
Oxidation	39, 62	—	—	—	—	—
—	12, 53	—	—	—	—	—
—	8, 32	—	—	—	—	2)184
—	34a, 52	—	—	—	—	—
—	43, 19	—	—	—	—	—
—	7a, 24	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	43, 19	—	—	—	—	—
—	21, 34	—	—	—	—	—
Oxidation	4, 19	—	—	—	—	2)187

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
415	Benzoic acid, 2-(6-keto-2-oxobenzoxazoyl)-	—	—	—	—	—
416	Benzoic acid, o-(p-toluoyl)-	00008552	—	—	—	—
417	Benzophenone, 4,4'-bis(diethylamino)-	000090937	—	—	—	—
418	Benzophenone, 4,4'-bis(dimethylamino)-	000090948	—	—	—	—
419	Benzothiazole, 2-(p-aminophenyl)-6-methyl-	000092364	—	—	—	—
420	7-Benzothiazole sulfonic acid, 2-(4-aminophynyl)-6-methyl-	000130176	—	—	—	—
421	Benzo[b] thiophen-3 (2H)-one	000130030	—	—	—	—
422	1H-Benzotriazole, 1,2,3-	000095147 (T56 BMNNJ)	—	Ltd animal exp. indicate mod. toxicity, LD50:1000 mg/kg, ipr-mus	—	—
423	Benzoxazole, 2-methyl-	000095216 (T56 BN DOJ C)	717 rat	—	—	—
424	Benzoxazole, 2-methyl-5-nitro-	032046518	—	—	—	—
425	2(3H)Benzoaxazolone	000059494	—	—	—	—
426	2(3H)Benzoxalone, 6-nitro-	004694911	—	—	—	—
427	Benzoyl chloride, m-nitro-	000121904 (WNR CVG)	2460 rat	—	—	—
428	Benzylamine, N-ethyl-N-phenyl-	000092591	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	34a, 52	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	6, 17	—	—	—	—	—
—	6,7 18	—	—	0.051/1974	—	—
—	17, 50	—	—	—	—	—
—	17, 50	—	—	—	—	—
—	43, 19	—	—	—	—	—
—	4, 23	—	—	—	—	2)199 3)444
—	26, 46	—	—	—	—	2)200
—	26, 46	—	—	—	—	—
—	26, 46	—	—	—	—	—
—	26, 46	—	—	—	—	—
—	4, 19	—	—	—	—	2)201
—	6,7, 17	—	—	0.217, 0.482/1974	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
429	4′,4‴-Biacetanilide	004471107 (1VMR DR DMV1)	—	—	—	TDLo:5300 mg/kg/ 35WC TFX:CAR orl-rat
430	4′,4‴-Biacetanilide 3′,3‴-diamino-	—	—	—	—	—
431	4′,4‴-Biacetanilide, 3′,3‴-dinitro-	006378901	—	—	—	—
432	[1,1′-Bianthracene]-9,9′,10,10′-tetrone, 2,2′-dimethyl-	019634903	—	—	—	—
433	2,2‴-Bi-2-naphtho-o-anisidide, 3′,3‴-dihydroxy-	—	—	—	—	—
434	Biphenyl, 4,4′-diamino-3,3′-dichloro-, hydrochloride	000091941 (ZR BG DR DZ CG)	—	LDLo:4740 mg/kg, orl-rat	USOS: CAR	TDLo:26 gm/kg/ 50W TFX:CAR orl-rat TDLo:6.5 mg/kg/ 44WI TFX:CAR scu-rat
435	[1,1′-Biphenyl]-4,4′-diamine, 2,2′-dimethoxy-	004746752	—	—	—	—
436	[1,1′-Biphenyl]-4,4′-diamine, sulfate	021136709	—	—	—	Experimental carcinogen
437	3,3′-Biphenyldiol, 2, 2′-dinitro-	—	—	—	—	—
438	2,2′-Biphenyldisulfonic acid, 4,4′-diamino-	000117613	—	—	—	—
439	3,3′-Biphenyldisulfonic acid, 4,4′-diamino-	003365900	—	—	—	—
440	3-Biphenylsulfonic acid, 4,4′-diamino-	002051890	—	—	—	—
441	3,3′,4,4′-Biphenyltetramine	000091952	LDLo:3000 mg/kg, rat	—	—	TDLo:9000 mg/kg/ 30D1 TFX:NEO orl-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	25a, 43	—	—	—	—	2)215
Reduction	25a, 43	—	—	—	—	—
—	25a, 43	—	—	—	—	—
—	25, 53	—	—	—	—	—
—	7c, 22	—	—	—	—	—
—	7b, 21	—	—	—	—	2)173
Alkaline Reduction	7c, 22	—	—	—	—	—
—	25a, 43	—	—	—	—	3)406, 5th ed., 1979
Reduction	26, 46	—	—	—	—	—
Ditto	5, 19 25a, 43	—	—	—	—	—
—	15, 43	—	—	—	—	—
—	15, 43	—	—	—	—	—
—	25a, 43	—	—	—	—	2)221

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
442	[m-m'-Bitolyl]-4,4-diamine	—	—	—	—	—
443	[m-m'-Bitolyl] 6,6'-disulfonic acid, 4, 4'-diamino-	028425550	—	—	—	—
444	Butanamide, N,N'-(3,3'-dimethyl[1,1'-biphenyl]-4,4'-diyl)bis[3-oxo-	000091963	—	—	—	—
445	Carbazole, 3-amino-9-ethyl-	— (T B656 HNJ DZ H2)	144 rat	—	—	—
446	Carbazole, 9-ethyl-	—	—	—	—	—
447	Carbazole, 9-ethyl-3-nitro-	—	—	—	—	—
448	N,N'-Carbonyl-bis(4-methoxy-methanilic acid)	—	—	—	—	—
449	Carboxtyril, 4-hydroxy-1-methyl-	—	LDLo:4650 mg/kg, rat	—	—	—
450	p-Cresidine (See Aniline, 2-methoxy-5-methyl-)					
451	p-Cresol, 2-nitro	000119335	3360 rat	—	—	—
452	2,3-Cresotic acid	—	—	—	—	—
453	Cyclopenta-[cd]-phenalene, 1H-,5,7-diketo	—	—	—	—	—
454	Dianiline, 4,4'-isopropylidene	—	—	—	—	—
455	Dianiline, 2,4'-thio-	—	—	—	—	—
456	Dianiline, 4,4'-thio-	000139651	—	—	—	—
457	Di-o-anisidine, 4,4'-cyclohexylidene-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Alkaline Reduction	29a, 48	—	—	—	—	—
Reduction	38, 61	—	—	—	—	—
—	29a, 48	—	—	—	—	—
—	20, 20	—	—	—	—	—
—	6, 20	—	—	—	—	—
—	6, 20	—	—	—	—	—
—	8b, 26	—	—	—	—	—
—	3, 19	—	—	—	—	2)296
—	15, 31	—	—	—	—	2)352
—	9, 30	—	—	—	—	—
—	1, 15	—	—	—	—	—
—	2c, 18	—	—	—	—	—
—	22, 18	—	—	—	—	—
—	2c, 17	—	—	—	—	—
—	7c, 22	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
458	o-Dianisidine dihydrochloride (See [1,1'-Biphenyl]-4,4'-diamine,2,2'-dimethoxy)					
459	Diazoaminobenzene	000136356 (RNUNMR)	224 rat	—	—	TDLo:37 gm/kg/61W TFX:CAR skn-mus
460	Diformo-m-phenylenediamine	—	—	—	—	—
461	Diformo-m-phenylenediamine,4-nitro-	—	—	—	—	—
462	Disulfide, bis(o-nitrophenyl)	021387939	—	—	—	—
463	Ethanolamine, N-phenyl (See Ethanol, 2-anilino)					
464	Ethanol, 2-m-(aminoanilino)-	—	—	—	—	—
465	Ethanol, 2-(p-aminophenoxy), hydrochloride	—	—	—	—	—
466	Ethanol, 2-anilino-	000122985 (Q2MR)	2230 rat	—	—	—
467	Ethanol, 2-(N-n-butylanilino)-	—	—	—	—	—
468	Ethanol, 2-(N-ethylanilino)-	000092002	—	—	—	—
469	Ethanol, 2-(N-ethylanilino)-	000092502	—	—	—	—
470	Ethanol, 2-(N-ethyl-p-toluidino)-	013386602	—	—	—	—
471	Ethanol, 2-(N-methylanilino)-	000093903 (Q2N1&R)	2830 rat	—	—	—
472	Ethanol, 2-(m-nitroanilino)-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	19,4, 15	—	—	—	—	2)1149 3)609
—	25c, 45	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	22, 21	—	—	—	—	—
Reduction	25c, 45	—	—	—	—	—
Ditto	28, 47	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	25b, 44	—	—	—	—	—
—	6-10, 17	—	—	0.163/1974	—	—
—	30, 50	—	—	—	—	—
—	2c, 18	—	—	—	—	—
—	25c, 45	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
473	Ethanol, 2-(*p*-nitrophenoxy)-	016365278	—	—	—	—
474	Formamide, N-(3-nitrophenyl)	000102385	—	—	—	—
475	Formanilide, 3'-amino-	—	—	—	—	—
476	*o*Formotoluidide, 4-nitro-	026198118	—	—	—	—
477	Hydrazine, 1-anthraquinonyl-	—	—	—	—	—
478	Hydrazine, (*p*-chlorophenyl)-	001073694	—	—	—	—
479	Hydrazine, 1-(5-chloro-*o*-tolyl)-	—	—	—	—	—
480	Hydrazine, 1,2-diphenyl	000122667 (RMMR)	301 rat	—	—	TDLo:16 gm/kg/1YI TFX:NEO scu-rat
481	2-Hydrazinesulfonic acid, 1-(1-anthraquinonyl)-	—	—	—	—	—
482	Hydroxylamine, N-phenyl-	000100652 (QMR)	—	TDLo:500 mg/kg TFX:SKN skn-hmn LDLo:50 mg/kg, scu-rbt	—	—
483	Isophthalic acid, 5-amino-	000099310	—	—	—	—
484	Isophthalic acid, 5-nitro-	000618882	—	—	—	—
485	4,4'-Isopropylidenedianiline (See Dianiline, 4,4'-isopropylidene-)					
486	Metanilic acid (See Benzenesulfonic acid, *m*-amino)					
487	Metanilic acid, 4-chloro (See Benzenesulfonic acid, 3-amino-4-chloro-)					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	28, 47	—	—	—	—	—
—	25c, 45	—	—	—	—	—
Reduction	25c, 45	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	35, 59	—	—	—	—	—
Reduction	4, 27	—	—	—	—	—
—	4, 48	—	—	—	—	—
Reduction	25a, 43	—	—	—	—	2)619
—	35, 59	—	—	—	—	—
Neutral Reduction	25a, 43	—	—	—	—	2)628
Reduction	22, 34	—	—	—	—	—
—	22, 34	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
488	Metanilic acid, 6-chloro	000088437	—	—	—	—
489	Metanilic acid, 2-hydroxy- (See Benzenesulfonic acid, 3-amino-4-hydroxy-)					
490	Metanilic acid, 4-hydroxy-	000098373	—	—	—	—
491	Metanilic acid, 4-hydroxy-5-nitro-	000096935	—	—	—	—
492	Metanilic acid, N,N-diethyl-	—	—	—	—	—
493	Metanilic acid, 6-nitro-	—	—	—	—	—
494	Methanesulfonic acid, anilino-	—	—	—	—	—
495	Methanesulfonic acid, o-anisidino	—	—	—	—	—
496	Methanol, 4,4'-bis (diethylaminophenyl)-	—	—	—	—	—
497	Naphthalene, 2-ethoxy	000093185 (L66J CO2)	—	LDLo:100 mg/kg, ipr-mus	—	—
498	Naphthalene, 1-nitro-	000086577 (L66J BNW)	—	—	—	—
499	2-Naphthalenecarboxamide, N-(3-chlorophenyl)-3-hydroxy-	005442400	120 rat	—	—	—
500	2-Naphthalenecarboxamide, N-(ethoxyphenyl)-3-hydroxy-	053232205	—	—	—	—
501	1,5-Naphthalenediol	000083567	—	—	—	—
502	1,3-Naphthalene-disulfonic acid, 6-amino-	000118332	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	9b, 28	—	—	—	—	—
Reduction	32, 51	—	—	—	—	—
Partial Reduction	8a, 25	—	—	—	—	—
—	25a, 43	—	—	—	—	—
—	25a, 43	—	—	—	—	—
—	2c, 18	—	—	0.211/1974	—	—
—	7c, 22	—	—	0.370/1974	—	—
—	6,7, 17	—	—	—	—	—
—	23g, 40	—	—	—	—	2)775
—	23a, 34	—	—	—	—	2)776
—	25b, 44	—	—	—	—	—
—	9c, 29	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23g, 40 23h, 41	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
503	1,3-Naphthalenedisulfonic acid, 7-amino-	000086657	—	—	—	—
504	1,3-Naphthalenedisulfonic acid, 7-hydroxy-	000118321	—	—	—	—
505	1,5-Naphthalenedisulfonic acid	000081049	—	—	—	—
506	1,5-Naphthalenedisulfonic acid, 2-amino-	000117624	—	—	—	—
507	1,5-Naphthalenedisulfonic acid, 3-amino-	000131271	—	—	—	—
508	1,5-Naphthalenedisulfonic acid, 4-amino-	000117555	—	—	—	—
509	1,5-Naphthalenedisulfonic acid, 4-hydroxy-	000117566	—	—	—	—
510	1,5-Naphthalenedisulfonic acid, 3-nitro-	000117862	—	—	—	—
511	1,5-Naphthalenedisulfonic acid, 4-nitro-	—	—	—	—	—
512	1,6-Naphthalenedisulfonic acid	000525371	—	—	—	—
513	1,6-Naphthalenedisulfonic acid, 8-amino-	000129919	—	—	—	—
514	1,6-Naphthalenedisulfonic acid, 8-hydroxy-	000117431	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	15, 41	—	—	—	—	—
—	15, 39	—	—	—	—	—
—	15, 37	—	—	—	—	3)949
—	15, 41	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	15, 38	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	15, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
515	1,6-Naphthalene-disulfonic acid, 8-nitro-	—	—	—	—	—
516	1,7-Naphthalene-disulfonic acid, 4-amino-5-hydroxy-	000130234	—	—	—	—
517	1,7-Naphthalene-disulfonic acid, 4-(benzoylamino)-5-hydroxy-	006361495	—	—	—	—
518	2,6-Naphthalene-disulfonic acid	000581759	—	—	—	—
519	2,6-Naphthalene-disulfonic acid, 3-amino-	006362045	—	—	—	—
520	2,6-Naphthalene-disulfonic acid, 3-nitro-	—	—	—	—	—
521	2,7-Naphthalene-disulfonic acid	000092411	—	—	—	—
522	2,7-Naphthalene-disulfonic acid, 4-acetamido-5-hydroxy-	000134349	—	—	—	—
523	2,7-Naphthalene-disulfonic acid, 3-amino-5-hydroxy-	000090404	—	—	—	—
524	2,7-Naphthalene-disulfonic acid, 4-amino-5-hydroxy-	000090200	—	—	—	—
525	2,7-Naphthalene-disulfonic acid, 4,4′-bis (diethylaminobenzhydrol) salt	—	—	—	—	—
826	2,7-Naphthalene-disulfonic acid, bis[(4-diethyl-aminophenyl)methyl] salt	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23c, 36	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	15, 35	—	—	—	—	—
—	23b, 35	—	—	—	—	—
—	23b, 35	—	—	—	—	—
—	15, 35	—	—	—	—	—
—	23c, 36	—	—	—	—	—
NaOH Fusion	23g, 40	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	8, 17 35	—	—	—	—	—
—	8, 17 35	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
527	2,7-Naphthalenedisulfonic acid, 4-chloro-5-hydroxy-	—	—	—	—	—
528	2,7-Naphthalenedisulfonic acid, 4,5-diamino-	—	—	—	—	—
529	2,7-Naphthalenedisulfonic acid, 4,5-dihydroxy-	000148254	—	—	—	—
530	2,7-Naphthalenedisulfonic acid, 4,5-dinitro-	—	—	—	—	—
531	2,7-Naphthalenedisulfonic acid, 1-hydroxy-	—	—	—	—	—
532	2,7-Naphthalenedisulfonic acid, 3-hydroxy-	000148754	—	—	—	—
533	2,7-Naphthalenedisulfonic acid, 4-nitro-	—	—	—	—	—
534	1-Naphthalenesulfonic acid	000085472	—	—	—	—
535	1-Naphthalenesulfonic acid, 2-amino-	000081163	—	—	—	—
536	1-Naphthalenesulfonic acid, 4-amino-	000084866	—	—	—	—
537	1-Naphthalenesulfonic acid, 5-amino-	000084899	—	—	—	—
538	1-Naphthalenesulfonic acid, 6-amino-	000081050	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23c, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	23b, 35	—	—	—	—	—
Reduction	2, 42	—	—	—	—	—
—	15, 39	—	—	—	—	—
—	2, 35	—	—	—	—	—
—	15, 36	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	15, 34	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23h, 41	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
539	1-Naphthalenesulfonic acid, 8-amino-	000082757	—	—	—	—
540	1-Naphthalenesulfonic acid, 4-amino-3-hydroxy-	000116632	—	—	—	—
541	1-Naphthalenesulfonic acid, 4-amino-5-hydroxy-	000083647	—	—	—	—
542	1-Naphthalenesulfonic acid, 4-amino-3-hydroxy-7-nitro-	006259638	—	—	—	—
543	1-Naphthalenesulfonic acid, 8-anilino-	000082768	—	—	—	—
544	1-Naphthalenesulfonic acid, 8-anilino-5-(p-hydroxyanilino)-	—	—	—	—	—
545	1-Naphthalenesulfonic acid, 4,5-dihydroxy-	—	—	—	—	—
546	1-Naphthalenesulfonic acid, 2-hydroxy-	000567475	—	—	—	—
547	1-Naphthalenesulfonic acid, 3-hydroxy-	—	—	—	—	—
548	1-Naphthalenesulfonic acid, 4-hydroxy-	000084871	—	—	—	—
549	1-Naphthalenesulfonic acid, 5-hydroxy-	000117599	—	—	—	—
550	1-Naphthalenesulfonic acid, 7-hydroxy-	000132570	—	—	—	—
551	1-Naphthalenesulfonic acid, 8-hydroxy-	000117226	—	—	—	—
552	1-Naphthalenesulfonic acid, 8-[(methylphenyl) amino]-	052918293	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23d, 37	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	23a, 34	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23e, 38	—	—	—	—	—
—	23e, 38	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
553	1-Naphthalenesulfonic acid, 5-nitro-	017521005	—	—	—	—
554	1-Naphthalenesulfonic acid, 8-nitro-	—	—	—	—	—
555	2-Naphthalenesulfonic acid	000120183 (L66J CSWQ)	400 rat	—	—	—
556	2-Naphthalenesulfonic acid, 6-acetamido-4-hydroxy-	—	—	—	—	—
557	2-Naphthalenesulfonic acid, 7-(acetylamino)-4-hydroxy-	006334970	—	—	—	—
558	2-Naphthalenesulfonic acid, 5-amino-	000119799	—	—	—	—
559	2-Naphthalenesulfonic acid, 6-amino-	000093005	—	—	—	—
560	2-Naphthalenesulfonic acid, 7-amino-	000494440	—	—	—	—
561	2-Naphthalenesulfonic acid, 8-amino-	000119288	—	—	—	—
562	2-Naphthalenesulfonic acid, 7-[*m*-(4-aminobenzamido)-benzamido] -4-hydroxy-	—	—	—	—	—
563	2-Naphthalenesulfonic acid, 7-(*p*-aminobenzamido)-4-hydroxy-	000119777	—	—	—	—
564	2-Naphthalenesulfonic acid, 5-amino-6-hydroxy-	—	—	—	—	—
565	2-Naphthalenesulfonic acid, 6-amino-4-hydroxy-	000090517	—	—	—	—
566	2-Naphthalenesulfonic acid, 7-amino-4-hydroxy-	000087025	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	15, 35	—	—	—	—	2)776
—	23f, 39	—	—	—	—	—
—	23i, 42	—	—	—	—	—
—	23b, 35	—	—	—	—	—
—	23f, 39 23h, 39	—	—	—	—	—
—	15, 41	—	—	—	—	—
—	23b, 35	—	—	—	—	—
Reduction	23i, 42	—	—	—	—	—
—	23i, 42	—	—	0.005/1974	—	—
Reduction	23g, 40	—	—	—	—	—
—	23h, 41	—	—	—	—	—
—	23g, 40 23h, 41	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
567	2-Naphthalenesulfonic acid, 5-amino-6-methoxy-	000086453	—	—	—	—
568	2-Naphthalenesulfonic acid, 6-anilino-4-hydroxy-	000119197	—	—	—	—
569	2-Naphthalenesulfonic acid, 7-anilino-4-hydroxy-	000119404	—	—	—	—
570	2-Naphthalenesulfonic acid, 7-(benzoylamino)-4-hydroxy-	000132876	—	—	—	—
571	2-Naphthalenesulfonic acid, 4,6-dihydroxy-	—	—	—	—	—
572	2-Naphthalenesulfonic acid, 6,7-dihydroxy-	000097273	—	—	—	—
573	2-Naphthalenesulfonic acid, 6-ethoxy-	—	—	—	—	—
574	2-Naphthalenesulfonic acid, 6-ethoxy-5-nitro-	—	—	—	—	—
575	2-Naphthalenesulfonic acid, 6-hydroxy-	000093016 (L66J CSWQ HQ)	LDLo:250 mg/kg, mus	—	—	—
576	2-Naphthalenesulfonic acid, 4-hydroxy-7-(m-nitrobenzamido)-	—	—	—	—	—
577	2-Naphthalenesulfonic acid, 4-hydroxy-7-[m-(p-nitrobenzamido) nitrobenzamido]-	—	—	—	—	—
578	2-Naphthalenesulfonic acid, 6-methoxy-	024431569	—	—	—	—
579	2-Naphthalenesulfonic acid, 6-methoxy-5-nitro-	—	—	—	—	—
580	2-Naphthalenesulfonic acid, 5-nitro-	000086691	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23f, 39	—	—	—	—	—
—	23h, 41	—	—	—	—	—
—	23h, 41	—	—	—	—	—
—	23i, 42	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	23g, 40	—	—	—	—	—
—	15,1 59	—	—	—	—	2)777
—	23i, 42 5, 19	—	—	—	—	—
—	24, 42	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23b, 35	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
581	2-Naphthalenesulfonic acid, 8-nitro-	018425746	—	—	—	—
582	2-Naphthalenesulfonic acid, 7,7'-ureylenebis (4-hydroxy-	000134474	—	—	—	—
583	2-Naphthalenesulfonyl chloride	000093118	—	—	—	—
584	1,4,5,8-Naphthalenetetracarboxylic acid	000128972	—	—	—	—
585	2-Naphthalenethiol	000091601 (L66J CSH)	—	LDLo:200 mg/kg, ipr-mus	—	—
586	1,3,5-Naphthalenetrisulfonic acid	006654644	—	—	—	—
587	1,3,5-Naphthalenetrisulfonic acid, 8-amino-	017894994	—	—	—	—
588	1,3,5-Naphthalenetrisulfonic acid, 8-nitro-	—	—	—	—	—
589	1,3,6-Naphthalenetrisulfonic acid	000086668	—	—	—	—
590	1,3,6-Naphthalenetrisulfonic acid, 2-amino-	—	—	—	—	—
591	1,3,6-Naphthalenetrisulfonic acid, 8-amino-	000117420	—	—	—	—
592	1,3,6-Naphthalenetrisulfonic acid, 4-hydroxy-	—	—	—	—	—
593	1,3,6-Naphthalenetrisulfonic acid, 8-hydroxy-	003316027	—	—	—	—
594	1,3,6-Naphthalenetrisulfonic acid, 8-nitro	038267311	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23b, 35	—	—	—	—	—
—	23i, 42	—	—	—	—	—
—	44, 35	—	—	—	—	—
—	40, 15	—	—	—	—	—
—	44, 35	—	—	—	—	2)778
—	15, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	15, 36	—	—	—	—	—
—	15, 40	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	15, 42	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
595	Naphthalic anhydride	000518058	—	—	—	—
596	Naphthalimide	000081834	—	—	—	—
597	Naphthalimide, N-methyl-	002382083	—	—	—	—
598	2-Naphthamide, 3-hydroxy-N-(2-hydroxyethyl)-	000092808	—	—	—	—
599	2-Naphthamide, 3-hydroxy-N-2-naphthyl-	000132683	—	—	—	—
600	2-Naphthamide, 3-hydroxy-N-2-naphthyl-	—	—	—	—	—
601	2-Naphthanilide, 4'-chloro-3-hydroxy-	—	—	—	—	—
602	2-Naphthanilide, 5'-chloro-3-hydroxy-2', 4'-dimethoxy-	000092728	—	—	—	—
603	2-Naphthanilide, 4'-chloro-3-hydroxy-2', 5'-dimethoxy-	004273921	—	—	—	—
604	2-Naphthanilide, 3-hydroxy-	000092773	—	—	—	—
605	2-Naphthanilide, 3-hydroxy-2-methoxy-6'-methyl-	—	—	—	—	—
606	2-Naphthanilide, 3-hydroxy-3'-nitro-	000135659	—	—	—	—
607	2-Naphtho-o-anisidide, 5'-chloro-3-hydroxy-	000137520	—	—	—	—
608	2-Naphtho-p-anisidide, 3-hydroxy-	000092795	—	—	—	—
609	2-Naphthoic acid, 3-amino-	005959524	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Oxidation	1, 15	—	—	—	—	—
—	41, 15	—	—	—	—	—
—	1, 15	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	23a, 34	—	—	—	—	—
—	23h, 41	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	40, 63	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	23f, 39	—	—	—	—	—
—	14, 31	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	18, 32	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	23f, 39	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
610	2-Naphthoic acid, 3,5-dihydroxy-	000089350	—	—	—	—
611	2-Naphthoic acid, 3-hydroxy-	000092706 (L66J CVQ DQ)	800 mus	—	—	—
612	2-Naphthoic acid, 3-hydroxy-5-sulfo-	000086646	—	—	—	—
613	2-Naphthol	000135193 (L66J CQ)	2420 rat	—	—	—
614	1-Naphthol, 5-amino-	000083556	—	—	—	—
615	1-Naphthol, 8-amino-	002834915	—	—	—	—
616	2-Naphthol, 8-amino-	—	—	—	—	—
617	1-Naphthol, 7-amino-3-sulfo- (See 2-Naphthalenesulfonic acid, 6-amino-4-hydroxy-)					
618	2-Naphthol, 5-amino-	000086975	—	—	—	—
619	2-Naphthol, 1-nitroso--	000131919	—	—	—	—
620	5-Naphthol, 1-amino- (See 1-Naphthol, 5-amino-)					
621	7-Naphthol, 1-amino- (See 2-Naphthol, 8-amino-)					
622	8-Naphthol, 1-amino- (See 1-Naphthol, 8-amino-)					
623	1-Naphthol-3-sulfonic acid, 6-amino- (See 2-Naphthalenesulfonic acid, 7-amino-4-hydroxy-)					
624	1-Naphthol-3-sulfonic acid, 6-anilino- (See 2-Naphthalenesulfonic acid, 7-anilino-4-hydroxy-)					
625	2-Naphthol-6-sulfonic acid (See 2-Naphthalenesulfonic acid, 6-hydroxy-)					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	23f, 39	—	—	—	—	—
—	23f, 39	—	—	—	—	2)779
—	15, 39	—	—	—	—	—
—	1, 35	—	—	—	—	—
—	—	—	—	—	—	—
—	23d, 37	—	—	—	—	—
—	23d, 35	—	—	—	—	—
—	23b, 35	—	—	—	—	—
—	1, 40	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
626	2-Naphthol-8-sulfonic acid (See 1-Naphthalenesulfonic acid, 6-hydroxy-)					
627	Naphtho[2,1-6] thiophen-1(2H)-one	000082600	—	—	—	—
628	2-Naphtho-o-toluidide, 3'-chloro-3-hydroxy-	—	—	—	—	—
629	2-Naphtho-o-toluidide, 4'-chloro-3-hydroxy-	000092762	—	—	—	—
630	2-Naphtho-o-toluidide, 3-hydroxy-	000135615	—	—	—	—
631	2-Naphtho-p-toludide, 3-hydroxy-	—	—	—	—	—
632	Napth-(1,2-d)1,2,3-oxadiazole-5-sulfonic acid	000233721	—	—	—	—
633	1-Naphthylamine	025168109 (L66J BZ)	779 rat	—	USOS: CAR	Yes - incriminated as cause os uninary bladder cancer TDLo:25 mg/kg/ TFX:NEO, scu-mus
634	1-Naphthylamine, N-ethyl-	000118445	—	—	—	—
635	2-Naphthylamine	000091598 (L66J CZ)	727 rat	—	USOS: CAR	TDLo:31 gm/kg/ YI TFX:CAR orl-rat
636	2-Phenazinol, 8-amino-7-methyl-	—	—	—	—	LDLo:200 mg/kg TFX:CAR ipr-mus TDLo:18 mg/kg TFX:CAR par-mus
637	p-Phenetidine	000156434	—	—	—	Recognized carcinogen
638	m-Phenetidine, N, N-diethyl-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	44, 35	—	—	—	—	—
—	29a, 48	—	—	—	—	—
—	2b, 49	—	—	—	—	—
—	29a, 48	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	4, 40	—	—	—	—	—
—	23a, 34 (Also 211, R of 1, p 523)	—	—	—	—	2)782 3)950
—	8,10, 34	—	—	—	—	—
—	23g, 40	—	—	—	—	2)782
Oxidation	4, 31 16, 47	—	—	—	—	—
Reduction	45, 29	—	—	—	—	—
—	25a, 43	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
639	m-Phenetidine, 4-nitroso-N,N-diethyl-	027292622	—	—	—	—
640	p-Phenetidine, 3-nitro-	—	—	—	—	—
641	Phenetole, p-nitro-	000100298	—	—	—	—
642	Phenol, p-N-acetylamino- (See Acetanilide, 4'-hydroxy-)					
643	PHenol, 4-N-acetylamino-2-nitro- (See Acetamide, N-(4-hydroxy-2-nitrophenyl-)					
644	Phenol, o-amino-	000095556 (ZR BQ)	—	LDLo:37 mg/kg scu-cat LD50:200 mg/kg ipr-mus	—	—
645	Phenol, p-amino-	000123308 (ZR DQ)	375 rat	LDLo:470 mg/kg scu-mus	—	—
646	Phenol, 2-amino-4-chloro-	000095852	—	—	—	—
647	Phenol, 2-amino-4-chloro-6-nitro-	006358083	—	—	—	—
648	Phenol, 2-amino-4-[-dimethylbenzyl)-	024133651	—	—	—	—
649	Phenol, 2-amino-4,6-dinitro-	000096913	—	—	—	—
650	Phenol, 4-amino-3-(2-methylanilino)-	—	—	—	—	—
651	Phenol, 2-amino-4-(methysulfonyl)-	000098306	—	—	—	—
652	Phenol, 2-amino-5-nitro-	000121880	—	—	—	—
653	Phenol, 4-amino-2-nitro-	000119346	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	25a, 43	—	—	—	—	—
—	9c, 29	—	—	—	—	—
—	9c, 29	—	—	—	—	—
Reduction	26, 46	—	—	—	—	2)859
Reduction	27, 47	—	—	—	—	2)859
Reduction	18, 32	—	—	—	—	—
—	18, 32	—	—	—	—	—
Reduction	26, 46	—	—	—	—	—
Partial Reduction	32, 51	—	—	—	—	—
Reduction	29a, 48	—	—	—	—	—
—	31, 51	—	—	—	—	—
Saponification	26, 46	—	—	—	—	—
—	27, 47	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
654	Phenol, 2-amino-4-(1,1,3,3-tetramethylbutyl)-	006073207	—	—	—	—
655	Phenol, 4-(4'-amino-3'-toluidino)-	—	—	—	—	—
656	Phenol, *m*-anilino-	0000101188	—	—	—	—
657	Phenol, *p*-anilino-	000122372	—	—	—	—
658	Phenol, 2-chloro-4, 6-dinitro-	000946316 (WNR BQ CG ENW)	LDLo:500 mg/kg rat	—	—	—
659	Phenol, 4-chloro-2, 6-dinitro-	000088879	—	—	—	—
660	Phenol, 2-chloro-4-nitro-	000619089 (WNR DQ CG)	LDLo:100 mg/kg rat	—	—	—
661	Phenol, 4-chloro-2 nitro-	000089645	—	—	—	—
662	Phenol, *p*-cyclohexyl-	001131608	—	—	—	—
663	Phenol, 2,4-diamino, dihydrochloride	000095863	—	—	—	—
664	Phenol, 2,6-dibromo-4-nitro-	000099285	—	—	—	—
665	Phenol, *m*-diethylamino-	000091689	—	—	—	—
666	Phenol, 4-(, -dimethylbenzyl)-2-nitro	024133640	—	—	—	—
667	Phenol, 2,4-dinitro-	000051285 (WNR BQ ENW)	30 rat	—	—	—
668	Phenol, *m*-nitro-	000554847 (WNR CQ)	447 rat	LDLo:83 mg/kg, ivn-dog	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	26, 46	—	—	—	—	—
—	31, 51	—	—	—	—	—
—	35, 60	—	—	—	—	—
—	20, 33	—	—	—	—	—
—	9c, 29	—	—	—	—	2)861
—	18, 32	—	—	—	—	—
—	9c, 29	—	—	—	—	2)861
—	18, 32	—	—	—	—	—
—	31, 51	—	—	—	—	—
Reduction	7e, 24	—	—	—	—	—
—	12, 47	—	—	—	—	—
—	25a, 43	—	—	—	—	—
—	26, 46	—	—	—	—	—
—	7e, 24	Emission factors: hydrocarbon - 3.0, NO_2 - 1.0	—	0.45/1975	—	2)863
—	25c, 45	—	—	—	—	2)866

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
669	Phenol, o-nitro-	000088755 (WNR CQ)	2828 rat	LDLo:100 mg/kg, ivn-dog	—	—
670	Phenol, 2-nitro-4-octyl-	024777057	—	—	—	—
671	Phenol, 4-nitroso-	000104916 (QR DNO)	—	LDLo:250 mg/kg, ipr-mus	—	—
672	m-Phenylenediamine	000108452 (ZR CZ)	LDLo:80 mg/kg, rat	Systemic poisoning is uncommon	—	—
673	o-Phenylenediamine	000095545 (ZR BZ)	—	LDLo:600 mg/kg, scu-rat	—	—
674	p-Phenylenediamine	000106503 (ZR DZ)	LDLo:100 mg/kg, rat	p-isomer is most toxic although systemic poisoning is uncommon	USOS air: TWA 100 ug/m^3 (skn)	—
675	m-Phenylenediamine, 4-chloro-	005131602	—	—	—	—
676	o-Phenylenediamine, 4-chloro-	000095830	—	—	—	—
677	m-Phenylenediamine, 2-chloro-5-sulfonic acid (See Benzenesulfonic acid, 4-chloro-3,5-diamino-)					
678	m-Phenylenediamine, 4-methoxy-N(1)-phenyl-	000615054	—	—	—	—
679	m-Phenylenediamine, 4-methoxy-	000615054	—	—	—	—
680	m-Phenylenediamine, 4-nitro-	005131588	—	—	—	—
681	Phthalic anhydride, 3-nitro-	000603112	—	—	—	—
682	Phthalic anhydride, 4-nitro-	000610275	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	7b, 21	—	—	—	—	2)866
—	26, 46	—	—	—	—	—
—	31, 51	—	—	—	—	2)866
Reduction	25c, 45	—	—	—	—	2)879 3)1013
—	40, 23	—	—	—	—	2)879 3)1013
Reduction	9c, 29	—	—	—	—	2)880 3)1013
Ditto	7e, 24	—	—	—	—	—
Ditto	18, 32	—	—	—	—	—
Ditto	18, 32	—	—	—	—	—
Ditto	7c, 22	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	34a, 52	—	—	—	—	—
—	34a, 52	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
683	Picric acid	000088891 (WNR BQ CNW ENW)	LDLo:120 mg/kg, rbt	Can cause allergic or irritative dermatitis	USOS air: TWA 0.1 mg/k^{3}	—
684	Propionitrile, 3-(N-acetanilino)-	—	—	—	—	—
685	Propionitrile, 3-aninilo-	001075769	—	—	—	—
686	Propionitrile, 3-(N-butylanilino)-	—	—	—	—	—
687	Propionitrile, 3-(N-ethylanilino)	000148878	—	—	—	—
688	Propionitrile, 3- (p-formyl-N-methyl-anilino)-	000094213	—	—	—	—
689	Propionitrile, 3-[(N-4-formyl-3-methylphenyl-N-methyl)amino]-	—	—	—	—	—
690	Propionitrile, 3-(N-methylanilino)-	000094348	—	—	—	—
691	Propionitrile, 3-[(N-methyl-N-3-methylphenyl) amino]-	—	—	—	—	—
692	2-Pyrazolin-5-one,1-(p-chlorophenyl)-3-methyl-	—	—	—	—	—
693	2-Pyrazolin-5-one, 1-(5-chloro-o-tolyl)-3-methyl-	—	—	—	—	—
694	5-Pyrazolone, 1-(4-chlorophenyl)-3-methyl- (See 2-Pyrazdin-5-one, 1-(p-chlorophenyl)-3-methyl-)					
695	5-Pyrazolone, 1-(2-chloro-5-sulfophenyl)-3-methyl- (See Benzenesulfonic acid, p-chloro-3-(3-methyl-5-oxo-2-pyrazolin-1-yl-)					
696	Pyrazolone, 1-(4-chloro-2-sulfophenyl)-3-methyl- (See Benzenesulfonic acid, m-chloro-6(3-methyl-5-oxo-2-pyrazolon-1-yl-)					

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	32, 51	—	—	—	—	3)1029 2)929
—	2a, 16	—	—	—	—	—
—	2a, 16	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	2b, 17	—	—	—	—	—
—	6, 18	—	—	—	—	—
—	28, 47	—	—	—	—	—
—	2c, 18	—	—	—	—	—
—	28, 47	—	—	—	—	—
—	4, 27	—	—	—	—	—
—	4, 48	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
697	5-Pyrazolone, 1(2,5-dichloro-4-sulfophenyl)-3-methyl- (See Benzenesulfonic acid, 2,5-dichloro-4-(3-methyl-5-oxo-2-pyrazolin-1-yl-)					
698	5-Pyrazolone, 3-methyl-1-(4-sulfophenyl)- (See Benzenesulfonic acid, p-(3-methyl-5-oxo-2-pyrazolin-1-yl-)					
699	Purpurin (See Anthracenedione, 1,2,4-trihydroxy-9,10-)					
700	4-Quinoneimine, N-(4-anilinophenyl)-	—	—	—	—	—
701	Resorcinol, 4-chloro-	000095885	—	—	—	—
702	Salicylic acid, 5-amino	000089576 (ZR DQ CVQ)	—	LDLo:313 mg/kg, ipr-mus	—	—
703	Salicylic acid, 5-nitro-	000096979	—	—	—	—
704	Sulfanilic acid	000121573	—	Animal experiments suggest low toxicity and slight irritation	—	—
705	Sulfanilic acid, N, N'-dibenzyl	004986703	—	—	—	—
706	Sulfanilic acid, 2, 5-dichloro-	000088506	—	—	—	—
707	Sulfanilic acid, 2-nitro-	000712243	—	—	—	—
708	Sulfanilyl chloride, N-acetyl	000121608 (WSGR DMV1)	--	TDLo:5100 ug/m^3 ihl-hum	—	—
709	Sulfone, 4-chloro-3-nitrophenyl methyl-	000097074	—	—	—	—
710	Sulfone, 2-chloro-5-nitrophenyl methyl-	021081743	—	—	—	—
711	Sulfone, p-chlorophenyl methyl-	000098577	—	—	—	—
712	o-Tolualdehyde, 4-[(2-chloroethyl)ethylamino]-	000092104	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	19, 33	—	—	—	—	—
—	12, 63	—	—	—	—	—
Reduction	36, 63	—	—	—	—	2)1043
—	36, 63	—	—	—	—	—
Baking	15, 16	—	—	—	—	—
—	2a, 16	—	—	—	—	—
—	15, 32	—	—	—	—	—
—	25c, 45	—	—	—	—	—
—	2a, 16	—	—	2.553/1974	—	2)1091
—	7b, 21	—	—	—	—	—
—	9a, 27	—	—	—	—	—
—	7a, 20	—	—	—	—	—
—	30, 50	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
713	Toluene, m-chloro-	000108418	—	—	—	—
714	Toluene, o-chloro-	000095498	—	—	—	—
715	Toluene, p-chloro-	000106434	—	—	—	—
716	Toluene, 2-chloro-4-nitro-	000121868	3020 rat	—	—	—
717	Toluene, 2-chloro-6-nitro-	00083421	—	—	—	—
718	Toluene, 4-chloro-2-nitro-	000089598	—	—	—	—
719	Toluene, 4-chloro-3-nitro-	000089601	—	—	—	—
720	2,4-Toluenedisulfonic acid	000121040	—	—	—	—
721	Toluene, 3-methoxy- (See Anisole, m-methyl-)					
722	Toluene, m-methoxy-2-nitro-	—	—	—	—	—
723	Toluene, 4-methoxy-3-nitro-	—	—	—	—	—
724	Toluene, o- , trichloro-	000088664	—	—	—	—
725	o-Toluenesulfonamide, 5-amino-	—	—	—	—	—
726	o-Toluenesulfonamide, 5-nitro-	006269916	—	—	—	—
727	p-Toluenesulfonamide; N-[4-(5-hydroxy-2,7-naphthadenedisulfonic acid)]-	—	—	—	—	—
728	p-Toluenesulfonate, 8-amino-3,6-disulfo-1-naphthyl	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	28, 47	—	—	—	—	—
—	39, 62	—	—	—	—	—
—	12, 60	—	—	—	—	—
—	12, 50	—	—	—	—	2)1139
—	12, 48	—	—	—	—	—
—	3, 48 12, 60	—	—	—	—	—
—	3, 60	—	—	—	—	—
—	15, 61	—	—	—	—	—
Nitration	14, 31	—	—	—	—	—
—	15, 31	—	—	—	—	—
—	12, 62	—	—	—	—	—
Reduction	30, 50	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	23c, 36	—	—	—	—	—
—	23c, 36	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
729	o-Toluenesulfonic acid, 5-amino-	000118887	—	—	—	—
730	m-Toluenesulfonic acid, 6-amino-	000098339	—	—	—	—
731	p-Toluenesulfonic acid, 2-amino-5-chloro-	000088539	—	—	—	—
732	m-Toluenesulfonic acid, 6-amino-4-chloro-	000088517	—	—	—	—
733	p-Toluenesulfonic acid, 3-chloro-	—	—	—	—	—
734	p-Toluenesulfonic acid, 3,5-diamino-	—	—	—	—	—
735	p-Toluenesulfonic acid 3,5-dinitro-	000088904	—	—	—	—
736	m-Toluenesulfonic acid, -(N-ethylanilino)-	000101111	—	—	—	—
737	o-Toluenesulfonic acid, 5-nitro-	000121039	—	—	—	—
738	p-Toluenesulfono-p-toluidide,	000599860	—	—	—	—
739	p-Toluenesulfono-p-toluidide, 2′-nitro-	—	—	—	—	—
740	p-Toluenesulfonyl chloride, 3-chloro-	—	—	—	—	—
741	o-Toluenesulfonyl chloride, 5-nitro-	000121028	—	—	—	—
742	o-Toluenethiol, 4-chloro-	017178017	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	30, 50	—	—	—	—	—
Baking	15, 50	—	—	—	—	—
Reduction	39, 62	—	—	—	—	—
Baking	15, 50	—	—	—	—	—
—	12, 61,62	—	—	—	—	—
Reduction	38, 61	—	—	—	—	—
—	38, 61	—	—	—	—	—
—	15, 17	—	—	—	—	—
—	5,15, 50	—	—	3.431/1974	—	—
—	30, 50	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	12, 62	—	—	—	—	—
—	30, 50	—	—	—	—	—
Reduction	28, 47	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
743	m-Toluidine	000108441 (ZR C)	974 rat	Material can produce severe systemic disturbances, although good data for comparing the o-, m-, and p isomers are not available	USOS air: TWA 5 ppm USOS air: TWA 22 mg/m^3	A recognized carcinogen
744	o-Toluidine	000099945 (ZR B)	—	Material can produce severe systemic disturbances, although good data for comparing the o, m, and p isomers are not available	USOS air: TWA 5 ppm USOS air: TWA 22 mg/m^3	A recognized carcinogen
745	p-Toluidine	000106490 (ZR D)	—	Material can produce severe systemic disturbances, although good data for comparing the o, m, and p isomers are not available	USOS air: TWA 5 ppm USOS air: TWA 22 mg/m^3	A recognized carcinogen
746	m-Toluidine, N-benzyl-N-ethyl-	000119948	—	—	—	—
747	o-Toluidine, 3-chloro-	000087605	—	—	—	—
748	p-Toludine, 3-chloro-	000097549 (ZR CG D)	1500 rat	—	—	—
749	o-Toluidine, 4-chloro-	000095692	—	—	—	—
750	o-Toluidine, 5-chloro-	000095794 (ZR CG F)	464 rat	LDLo:310 mg/kg, scu-cat	—	—
751	p-Toluidine, N-(2-chloroethyl)-N-ethyl-	—	—	—	—	—
752	o-Toluidine, 4-chloro-5-nitro-	—	—	—	—	—
753	o-Toluidine, 5-(N,N-diethylamino)-	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
Reduction	28, 47	—	—	—	—	2)1142 3)22 1175-6
Ditto	19, 48	—	—	—	—	2)1142 3)22 1175-6
Ditto	30, 50	—	—	—	—	Ditto
—	4, 47	—	—	—	—	—
—	45, 48	—	—	—	—	—
—	30, 50	—	—	—	—	2)1143
Saponification	29b, 49	—	—	—	—	—
Reduction	29a, 48	—	—	—	—	2)1143
—	30, 50	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	29b, 49	—	—	—	—	—

(Continued)

TABLE B-2. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
754	m-Toluidine, N-ethyl-	000102272	—	—	—	—
755	m-Toluidine, N-methyl-	000696446	—	—	—	—
756	o-Toluidine, 4-methoxy-5-nitro-	—	—	—	—	—
757	p-Toluidine, 2-nitro-	000089623	—	—	—	—
758	p-Toluidine, 3-nitro-	000119324 (ZR D CNW)	3 bdw	—	—	—
759	o-Toluidine, 4-nitro-	000099523	—	—	—	—
760	o-Toluidine, 6-nitro-	000570241	—	—	—	—
761	Trimellitic acid, 5-amino (See 1,2,4-Benzenetricarboxylic acid, 5-amino-)					
762	Trimellitic acid, 5-hydroxy- (See 1,2,4-Benzenetricarboxylic acid, 5-hydroxy-)					
763	Trimellitic acid, 5-nitro- (See 1,2,4-Benzenetricarboxylic acid, 5-nitro-)					
764	2,4'-Xylidine	000095681 (ZR B D)	467 rat	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^6 kg/year	Uses	References
—	28, 47	—	—	—	—	—
—	28, 47	—	—	—	—	—
—	29b, 49	—	—	—	—	—
—	30, 50	—	—	—	—	—
—	30, 50	—	—	—	—	2)1144
—	29b, 49 29a, 48	—	—	—	—	—
—	29a, 48	—	—	—	—	—
Reduction	42, 63	—	—	—	—	2)1202

TABLE B-3. ORGANIC DYES AND PIGMENTS-TOXICITY

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1	CI10005 Mordant Green 4	—	—	—	—	—
2	CI10006 Pigment Green 8	015635537	—	—	—	—
3	CI10020 Acid Green 1	019381501	—	—	—	—
4	CI10020 D&C Green 8	006358696	—	—	—	—
5	CI10316 Ext. D&C Yellow 7	000846708	—	—	—	—
6	CI10316 Acid Yellow 1	000846708	—	—	—	—
7	CI10338 Disperse Yellow 42	005124254	—	—	—	—
8	CI10345 Disperse Yellow 1	000119153	—	—	—	—
9	CI10395 Acid Brown 1	—	—	—	—	—
10	CI11000 Solvent Yellow 1	000060093 (ZR DNUNR)	—	—	—	TDLo:1600 mg/kg/2.3YI TFX:CAR, skn-rat
11	CI11000 Pigment Yellow 98	—	—	—	—	—

PROCESS, WASTE, PRODUCTION AND DATA

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Nitrosation Filtration	1	Air: nitrogen oxide Water: inorganic salt solutions	Nitrogen oxide fumes escape from a tall stack or pipe. Usually no effort has been made to control fluid effluents	—	—	—
Ditto	1	Ditto	Ditto	67.3/1973	—	—
Nitrosation Filtration Precipitation	1 18	Air: nitrogen oxide Water: inorganic salt solutions and brines which may contain residual amounts of metal ions	Ditto	—	—	—
—	—	—	—	—	—	—
See Item 3	2	Air: nitrogen oxide Water: inorganic salt solutions and nitrogen oxides	Nitrogen oxides are difficult to control by water scrubbing	404/1973	—	—
Ditto	2	Ditto	Ditto	—	—	—
Replacement Reaction Filtration	3	Water: brine contaminated with small amounts of organic substances	—	—	—	—
Ditto	3	Ditto	—	—	—	—
—	3	Ditto	—	—	—	—
Diazotization Coupling	4	Water: inorganic salts	—	53.6/1973	—	2)29, Splmnt
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
12	CI11005 Disperse Orange 3	000730405	—	—	—	—
13	CI11014 Basic Red 30	—	—	—	—	—
14	CI11020 Solvent Yellow 2	000060117 (1N1&R DNUNR)	800 rat	—	—	TDLo:800 mg/kg/ 40D, TFX:CAR orl-rat TDLo:11 gm/kg/ 12WC, TFX:NEO orl-mus
15	CI11021 Solvent Yellow 56	002481949	300 mus	—	—	—
16	CI11043 Basic Violet 18	—	—	—	—	—
17	CI11052 Basic Blue 54	015000596	—	—	—	—
18	CI11085 Basic Red 18	014097031	—	—	—	—
19	CI11100 Disperse Orange 5	006232560	—	—	—	—
20	CI11110 Disperse Red 1	002872528	—	—	—	—
21	CI11115 Disperse Red 13	003180812	—	—	—	—
22	CI11150 Disperse Red 7	004540005	—	—	—	—
23	CI11152 Disperse Brown 1	—	—	—	—	—
24	CI11154 Basic Blue 41	—	—	—	—	—
25	CI11160 Solvent Yellow 3	000097563	—	—	—	—
26	CI11210 Disperse Red 17	003179893	—	—	—	—
27	CI11215 Disperse Red 5	00376951	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	2)330, 108
Ditto	4	Ditto	—	39.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	254/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	160/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	123/1973	—	—
Ditto	4	Ditto	—	46.4/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
28	CI11250 Disperse Red 31	002475436	—	—	—	—
29	CI11255 Disperse Black 2	006232571	—	—	—	—
30	CI11270 Basic Orange 2	000532821 (ZR CZ DNUNR & GH)	LDLo:158 mg mg/kg, mus	—	—	TDLo:158 mg/kg/ 56WC, TFX:NEO orl-mus
31	CI11290 Mordant Brown 12	—	—	—	—	—
32	CI11320 Basic Orange 1	005042546	—	—	—	—
33	CI11365 Disperse Black 1	00605484	—	—	—	—
34	CI11450 Basic Yellow 25	041025676	—	—	—	—
35	CI11460 Basic Red 29	—	—	—	—	—
36	CI11480 Basic Yellow 24	—	—	—	—	—
37	CI11660 Pigment Yellow 5	—	—	—	—	—
38	CI11665 Pigment Yellow 4	001657165	—	—	—	—
39	CI11670 Pigment Yellow 6	004106767	—	—	—	—
40	CI11680 Pigment Yellow 1	002512290	—	—	—	—
41	CI11710 Pigment Yellow 3	006486233	—	—	—	—
42	CI11720 Pigment Yellow 9	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	221/1973	—	2)881, 330
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	142/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	306/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	189/1973	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
43	CI11725 Pigment Orange 1	006371966	—	—	—	—
44	CI11738 Pigment Yellow 73	—	—	—	—	—
45	CI11740 Pigment Yellow 65	—	—	—	—	—
46	CI11741 Pigment Yellow 74	—	—	—	—	—
47	CI11765 Pigment Yellow 49	—	—	—	—	—
48	CI11767 Pigment Yellow 97	012225182	—	—	—	—
49	CI11770 Pigment Yellow 75	—	—	—	—	—
50	CI11855 Disperse Yellow 3	002832408	—	—	—	—
51	CI11920 Solvent Orange 1	002051856	—	—	—	—
52	CI12055 Solvent Yellow 14	000842079 (L66J BNUNR&CQ)	—	—	—	TDLo:56 gm/kg/ 52WC, TFX:NEO orl-mus
53	CI12060 Pigment Orange 2	006410099	—	—	—	—
54	CI12070 Light Pigment Red 1	006410102	—	—	—	—
55	CI12071 Pigment Brown 2	—	—	—	—	—
56	CI12075 Pigment Orange 5	003468631	—	—	—	—
57	CI12075 D&C Orange 17	003468631	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	290/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	1704/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	256/1973		2)780, 330
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	364/1973	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
58	CI12085 D&C Red 36	002814779	—	—	—	—
59	CI12085 Pigment Red 4	002814779	—	—	—	—
60	CI12090 Pigment Red 6	006410135	—	—	—	—
61	CI12100 Solvent Orange 2	002646175 (L66J BNUNR B & CQ)	LDLo:500 mg/kg, rat	—	—	TDLo:6 mg/kg/ 52W, TFX:CAR scu-mus
62	CI12120 Pigment Red 3	002425856	—	—	—	—
63	CI12140 Solvent Orange 7	003118976 (L66J BNUNR B D & CQ)	—	—	—	TDLo:80 mg/kg TFX:NEO imp-mus
64	CI12150 Solvent Red 1	001229556	—	—	—	—
65	CI12170 Pigment Red 40	002653647	—	—	—	—
66	CI12200 Mordant Black 19	—	—	—	—	—
67	C11210 Basic Blue 16	004569884	—	—	—	—
68	CI12245 Direct Red 76	001325639	—	—	—	—
69	CI12310 Pigment Red 2	006041947	—	—	—	—
70	CI12315 Pigment Red 22	006448959	—	—	—	—
71	CI12350 Pigment Red 18	003564225	—	—	—	—
72	CI12355 Pigment Red 23	006471494	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	5.0/1973	—	—
Ditto	4	Ditto	—	135/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	2)330, 781
Ditto	4	Ditto	—	814/1973	—	—
Ditto	4	Ditto	—	35.5/1973	—	2)330, 781
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	35.5/1973	—	—
Ditto	4	Ditto	—	58.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	122/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
73	CI12360 Pigment Red 31	—	—	—	—	—
74	CI12370 Sodium Pigment Red 112	006535462*	—	—	—	—
75	CI12370 Pigment Red 112	006535462	—	—	—	—
76	CI12380 Pigment Red 14	—	—	—	—	—
77	CI12390 Pigment Red 17	006655841	—	—	—	—
78	CI12395 Pigment Red 13	—	—	—	—	—
79	CI12420 Pigment Red 7	006471518	—	—	—	—
80	CI12440 Pigment Red 10	006410351	—	—	—	—
81	CI12460 Pigment Red 9	006410384	—	—	—	—
82	CI12465 Pigment Red 15	—	—	—	—	—
83	CI12480 Pigment Brown 1	006410408	—	—	—	—
84	CI12485 Pigment Red 146	—	—	—	—	—
85	CI12490 Pigment Red 5	006410419	—	—	—	—
86	CI12515 Pigment Red 176	—	—	—	—	—
87	CI12690 Disperse Yellow 8	006358492	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	36.8/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	45.5/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
88	CI12710 Pigment Yellow 10	006407756	—	—	—	—
89	CI12715 Solvent Red 8	—	—	—	—	—
90	CI12775 Pigment Green 10	006421654	—	—	—	—
91	CI12790 Disperse Yellow 5	006439538	—	—	—	—
92	CI13010 Acid Dye 0	—	—	—	—	—
93	CI13025 Acid Orange 52	000547580	—	—	—	—
94	CI13058 D&C Red 39	063715571	—	—	—	—
95	CI13065 External D&C Yellow 1	000587984	—	—	—	—
96	CI13065 Acid Yellow 36	000587984	—	—	—	—
97	CI13080 Acid Orange 5	000554734	—	—	—	—
98	CI13090 Acid Orange 1	—	—	—	—	—
99	CI13095 Acid Yellow 63	—	—	—	—	—
100	CI13150 Acid Orange 50	—	—	—	—	—
101	CI13225 Mordant Brown 13	006054804	—	—	—	—
102	CI13250 Mordant Brown 33	003618620	—	—	—	—
103	CI13265 Mordant Brown 49	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	89.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
104	CI13360 Mordant Dye 0	—	—	—	—	—
105	CI13361 Acid Green 35	—	—	—	—	—
106	CI13390 Acid Blue 92	003861732 (L66J BQ DS-WQ HSWQ JNUN BL66J EMR& GSWQ &-NA- 3)	—	LD50:450 mg/kg, ivn-mus	—	—
107	CI13425 Acid Green 12	—	—	—	—	—
108	CI13900 Acid Yellow 99	010343585	—	—	—	—
109	CI13900 Solvent Yellow 19	010343585*	—	—	—	—
110	CL13906 Acid Yellow 151	—	—	—	—	—
111	CI13920 Direct Yellow 8	—	—	—	—	—
112	CI13950 Direct Yellow 27	—	—	—	—	—
113	CI14025 Mordant Yellow 1	000584429	—	—	—	—
114	CI14030 Mordant Orange 1	001718349	—	—	—	—
115	CI14055 Mordant Yellow 14	—	—	—	—	—
116	CI14110 Mordant Yellow 20	—	—	—	—	—
117	CI14130 Mordant Yellow 5	006054984	—	—	—	—
118	CI14135 Mordant Yellow 36	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	35.5/1973	—	2)330, 773
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	42.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	818/1973	—	—
Ditto	4	Ditto	—	10.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
119	CI14155 Direct Green 28	006471096	—	—	—	—
120	CI14170 Acid Yellow 65	—	—	—	—	—
121	CI14250 Mordant Brown 19	—	—	—	—	—
122	CI14270 Acid Orange 6	000547579	—	—	—	—
123	CI14625 Acid Brown 6	006409105	—	—	—	—
124	CI14640 Mordant Black 3	003564145	—	—	—	—
125	CI14645 Mordant Black 11	001787617	—	—	—	—
126	CI14700 FD&C Red 4	004548532 (L66J BQ CNUNR B D ESWO& ESWO &-NA- 2)	—	—	—	TDLo:428 mg/kg/ 65WC, TFX:CAR orl-rat
127	CI14710 Acid Red 4	005858399	—	—	—	—
128	CI14720 Acid Red 14	003567699 (L66J BSWQ ENUN- CL66J BQ ESWG &-NA-2)	—	LD50:900 mg/kg, ipr-rat	—	—
129	CI14830 Calcium Pigment Red 54	—	—	—	—	—
130	CI14856 Mordant Blue 9	003624688	—	—	—	—
131	CI14870 Mordant Brown 15	008006028	—	—	—	—
132	CI14880 Acid Blue 158	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	24.1/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	2)330, 778
Ditto	4	Ditto	—	69.6/1973	—	—
Ditto	4	Ditto	—	60.0/1973	—	2)330, 777
Ditto	4	Ditto	—	34.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	540/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
133	CI15050 Acid Blue 158	—	—	—	—	—
134	CI15075 Direct Red 20	005850737	—	—	—	—
135	CI15510 Acid Orange 7	000633965	—	—	—	—
136	CI15510 Lake Pigment Orange 17	000633965*	—	—	—	—
137	CI15510 D&C Orange 4	000633965	—	—	—	—
138	CI15575 Acid Orange 8	005850862	—	—	—	—
139	CI15585 Sodium Pigment Red 53	002092560	—	—	—	—
140	CI15585 Barium Pigment Red 53	002092560*	—	—	—	—
141	CI15585 D&C Red 9	024777239	—	—	—	—
142	CI15585 D&C Red 8	002092560	—	—	—	—
143	CI15620 Acid Red 88	001658566	—	—	—	—
144	CI15630 D&C Red 10	001248186	—	—	—	—
145	CI15630 D&C Red 13	006371671	—	—	—	—
146	CI15630 D&C Red 12	001103384	—	—	—	—
147	CI15630 D&C Red 11	001103395	—	—	—	—
148	CI15630 Sodium Pigment Red 49	001248186	—	—	—	—
149	CI15630 Calcium Pigment Red 49	001103395	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	540/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	257/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	2.27/1973	—	—
Ditto	4	Ditto	—	125/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	1445/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	458/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	1.8/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	6.8/1973	—	—
Ditto	4	Ditto	—	634/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
150	CI15630 Barium Pigment Red 49	001103384	—	—	—	—
151	CI15670 Mordant Violet 5	002092559	—	—	—	—
152	CI15705 Mordant Black 17	002538854	—	—	—	—
153	CI15710 Mordant Black 1	003618584	—	—	—	—
154	CI15711 Acid Black 52	005610640	—	—	—	—
155	CI15800 Pigment Brown 5	027757795*	—	—	—	—
156	CI15800 D&C Red 31	027757795*	—	—	—	—
157	CI15800 Pigment Red 64	027757795	—	—	—	—
158	CI15820 Pigment Red 55	027873627	—	—	—	—
159	CI15825 Pigment Red 58	025310978	—	—	—	—
160	CI15826 Pigment Red 77	—	—	—	—	—
161	CI15850 Calcium Pigment Red 57	005281049	—	—	—	—
162	CI15850 D&C Red 7	005281049	—	—	—	—
163	CI15850 D&C Red 6	005858811	—	—	—	—
164	CI15860 Pigment Red 52	005858822	—	—	—	—
165	CI15865 Pigment Red 48	016013448	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	1997/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	385/1973	—	—
Ditto	4	Ditto	—	63.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	717/1973	—	—
Ditto	4	Ditto	—	27.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	1505/1973	—	—

(Continued

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
166	CI15880 Pigment Red 63	021416466	—	—	—	—
167	CI15880 D&C Red 34	021416466*	—	—	—	—
168	CI15970 Acid Orange 12	001934209	—	—	—	—
169	CI15985 D&C Yellow 6	002783940 (L66J BNUNR DSWQ& CQ HSWQ &-NA- 2)	—	LD50:3800 mg/kg, ipr-rat	—	TDLo:2750 mg/kg/ 28WI, TFX:NEO scu-rat
170	CI15985 FD&C Yellow 6	Ditto	—	Ditto	—	Ditto
171	CI15995 Acid Orange 31	—	—	—	—	—
172	CI16055 Acid Violet 56	—	—	—	—	—
173	CI16105 Lake Pigment Red 60	001836222*	—	—	—	—
174	CI16105 Mordant Red 9	001836222	—	—	—	—
175	CI16150 Acid Red 26	003761533	—	—	—	—
176	CI16180 Acid Red 17	005858333	—	—	—	—
177	CI16185 Acid Red 27	000915673 (L66J BSWQ ENUN- BL66J CQ DSWQ HSWQ &-NA- 3)	—	LDLo:1500 ug/kg/ (preg), TFX:TER orl-rat LD50:1000 mg/kg ipr-rat	—	TDLo:172 gm/kg 26WC, TFX:CAR orl-rat
178	CI16185 FD&C Red 2	00915673	—	Ditto	—	Ditto
179	CI16185 D&C Red 2	00915673*	—	—	—	—
180	CI16230 Acid Orange 10	001936158	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	20.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	2)330, 777
Ditto	4	Ditto	—	473/1973	—	Ditto
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	155/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	15.5/1973	—	—
Ditto	4	Ditto	—	—	—	2)330, 774
Ditto	4	Ditto	—	576/1973	—	2)330, 774
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	117/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
181	CI16255 Acid Red 18	002611827 (L66J CO HSWO JSWO BNUN-)	—	LD50:600 mg/kg, ipr-rat	—	TDLo:524 mg/kg/ 74WC, TFX:CAR orl-rat
182	CI16260 Acid Violet 58	— (BL66J ESWO &-NA- 4)	—	—	—	—
183	CI16260 Solvent Red 35	—	—	—	—	—
184	CI16500 Mordant Black 9	000548801	—	—	—	—
185	CI16575 Acid Red 176	004682477	—	—	—	—
186	CI16580 Acid Violet 3	001681603	—	—	—	—
187	CI16600 Acid Violet 6	004197095	—	—	—	—
188	CI17025 Acid Violet 1	—	—	—	—	—
189	CI17045 Acid Red 37	006360072	—	—	—	—
190	CI17065 Acid Red 32	—	—	—	—	—
191	CI17200 Acid Red 33	003567666	—	—	—	—
192	CI17200 D&C Red 33	003567666	—	—	—	—
193	CI17235 Mordant Green 36	003769617	—	—	—	—
194	CI17590 Mordant Brown 40	—	—	—	—	—
195	CI17755 Acid Red 137	006222635	—	—	—	—
196	CI17757 Reactive Orange 16	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	63.6/1973	—	2)330, 777
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	17.7/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	28.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	59.1/1973	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
197	CI17820 Direct Red 123	—	—	—	—	—
198	CI17908 Reactive Red 8	025489365	—	—	—	—
199	CI17916 Reactive Black 1	012236770	—	—	—	—
200	CI17995 Acid Red 133	006417363	—	—	—	—
201	CI18050 Acid Red 1	003734676	—	—	—	—
202	CI18055 Acid Violet 7	004321691	—	—	—	—
203	CI18065 Acid Red 35	006441936	—	—	—	—
204	CI18073 Acid Red 138	—	—	—	—	—
205	CI18075 Acid Violet 12	—	—	—	—	—
206	CI18096 Reactive Violet 4	—	—	—	—	—
207	CI18097 Reactive Violet 5	012226389	—	—	—	—
208	CI18105 Reactive Red 4	015623662	—	—	—	—
209	CI18110 Acid Red 106	—	—	—	—	—
210	CI18158 Reactive Red 1	017752851	—	—	—	—
211	CI18159 Reactive Red 3	023211474	—	—	—	—
212	CI18160 Mordant Black 38	000641969	—	—	—	—
213	CI18165 Acid Black 60	012218950	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	207/1973	—	—
Ditto	4	Ditto	—	90/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
214	CI18690 Acid Yellow 121	—	—	—	—	—
215	CI18695 Acid Yellow 4	—	—	—	—	—
216	CI18710 Mordant Yellow 30	014904519	—	—	—	—
217	CI18732 Acid Orange 60	—	—	—	—	—
218	CI18740 Acid Orange 72	—	—	—	—	—
219	CI18745 Acid Orange 74	010127272	—	—	—	—
220	CI18745 Solvent Orange 5	010127272*	—	—	—	—
221	CI18760 Mordant Red 7	003618631	—	—	—	—
222	CI18761 Acid Red 201	—	—	—	—	—
223	CI18800 Acid Red 183	006408317	—	—	—	—
224	CI18810 Acid Red 186	052677448	—	—	—	—
225	CI18820 Acid Yellow 11	006359826	—	—	—	—
226	CI18821 Mordant Yellow 8	—	—	—	—	—
227	CI18835 Acid Yellow 25	006359859	—	—	—	—
228	CI18850 Acid Yellow 25	025739677	—	—	—	—
229	CI18870 Acid Orange 76	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	148/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	40.0/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	33.2/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
230	CI18890 Acid Yellow 34	—	—	—	—	—
231	CI18900 Acid Yellow 29	006359917	—	—	—	—
232	CI18940 Mordant Orange 4	006359962	—	—	—	—
233	CI18950 Acid Yellow 40	006372969	—	—	—	—
234	CI18960 Acid Yellow 14	—	—	—	—	—
235	CI18965 Acid Yellow 17	006359984	—	—	—	—
236	CI18990 Reactive Yellow 13	—	—	—	—	—
237	CI19010 Acid Yellow 54	010127056	—	—	—	—
238	CI19140 Acid Yellow 23	001934210	—	—	—	—
239	CI19140 D&C Yellow 5	001934210*	—	—	—	—
240	CI19140 FD&C Yellow 5	001934210	—	—	—	—
241	CI19350 Mordant Dye 1	—	—	—	—	—
242	CI19351 Acid Red 179	—	—	—	—	—
243	CI19540 Direct Yellow 9	001829001	—	—	—	—
244	CI19555 Direct Yellow 28	008005729	—	—	—	—
245	CI19556 Direct Yellow 29	006537662	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salt	—	40.0/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	117/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	149/1973	—	—
Ditto	4	Ditto	—	26.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	287/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	626/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	93.2/1973	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
246	CI19600 Mordant Brown 21	006232515	—	—	—	—
247	CI20040 Pigment Yellow 16	005979282	—	—	—	—
248	CI20110 Mordant Brown 1	003654156	—	—	—	—
249	CI20150 Mordant Brown 18	—	—	—	—	—
250	CI20170 Acid Orange 24	001320076	—	—	—	—
251	CI20195 Acid Brown 14	—	—	—	—	—
252	CI20440 Acid Green 19	005850340	—	—	—	—
253	CI20460 Acid Blue 29	—	—	—	—	—
254	CI20470 Acid Black 1	000106448	—	—	—	—
255	CI20480 Acid Black 41	—	—	—	—	—
256	CI20495 Acid Green 20	005850395	—	—	—	—
257	CI20505 Reactive Black 5	012225251	—	—	—	—
258	CI21000 Basic Brown 1	010114586	—	—	—	—
259	CI21010 Basic Brown 4	005421669	—	—	—	—
260	CI21010 Pigment Brown 3	005421669*	—	—	—	—
261	CI21010 Solvent Brown 12	005421669*	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	14.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	210/1973	—	—
Ditto	4	Ditto	—	127/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	357/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	10.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	59/1973	—	—
Ditto	4	Ditto	—	235/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	9.1/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
262	CI21030 Basic Brown 2	—	—	—	—	—
263	CI21090 Pigment Yellow 12	006358856	—	—	—	—
264	CI21095 Pigment Yellow 14	005468757	—	—	—	—
265	CI21096 Pigment Yellow 55	—	—	—	—	—
266	CI21100 Pigment Yellow 13	005102830	—	—	—	—
267	CI21105 Pigment Yellow 17	004531491	—	—	—	—
268	CI21108 Pigment Yellow 83	005567157	—	—	—	—
269	CI2110 Pigment Orange 13	003520727	—	—	—	—
270	CI2115 Pigment Orange 34	—	—	—	—	—
271	CI21120 Pigment Red 38	006358878	—	—	—	—
272	CI21130 Pigment Orange 15	—	—	—	—	—
273	CI21160 Pigment Orange 16	—	—	—	—	—
274	CI21165 Pigment Orange 14	—	—	—	—	—
275	CI21180 Pigment Blue 25	024876322	—	—	—	—
276	CI21200 Pigment Red 41	006505299	—	—	—	—
277	CI21230 Solvent Yellow 29	010127034	—	—	—	—
278	CI21240 Solvent Yellow 30	003321106	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: Inorganic salts	—	—	—	—
Ditto	4	Ditto	—	3.817/1973	—	—
Ditto	4	Ditto	—	1.225/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	261/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	149/1973	—	—
Ditto	4	Ditto	—	40.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	171/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
279	CI21250 Solvent Red 22	006706758	—	—	—	—
280	CI22120 Direct Red 28	000573580 (L66J B2 ESWQ CNUNR D2 &-NA- 2)	—	TDLo:80 mg/kg/ (8D preg) TFX: TER unk-rat LD50:190 mg/kg, ivn-rat	—	—
281	CI22130 Direct Orange 8	002429701	—	—	—	—
282	CI22140 Direct Orange 8	—	—	—	—	—
283	CI22145 Direct Red 10	002429701	—	—	—	—
284	CI22155 Direct Red 13	001937355	—	—	—	—
285	CI22165 Direct Dye 0	—	—	—	—	—
286	CI22195 Acid Orange 45	002429803	—	—	—	—
287	CI22240 Direct Red 37	—	—	—	—	—
288	CI22245 Acid Red 85	003567655	—	—	—	—
289	CI22310 Direct Red 1	002429847	—	—	—	—
291	CI22345 Direct Brown 59	003476902	—	—	—	—
292	CI22370 Direct Orange 1	—	—	—	—	—
293	CI22375 Direct Orange 1	—	—	—	—	—
294	CI22410 Direct Yellow 20	—	—	—	—	—
295	CI22430 Direct Orange 1	—	—	—	—	—
296	CI22460 Direct Violet 27	—	—	—	—	—
297	CI22480 Direct Violet 22	006426671	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	136/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	60.0/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	60.5/1973	—	—
Ditto	4	Ditto	—	76.8/1973	—	—
Ditto	4	Ditto	—	90.9/1973	—	—
Ditto	4	Ditto	—	67.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
298	CI22570 Direct Violet 1	002586609	—	—	—	—
299	CI22590 Direct Blue 2	002429734	—	—	—	—
300	CI22870 Acid Orange 63	—	—	—	—	—
301	CI22880 Mordant Yellow 26	006232491	—	—	—	—
302	CI22890 Acid Red 97	—	—	—	—	—
303	CI22895 Acid Orange 56	—	—	—	—	—
304	CI22910 Acid Yellow 42	006375559	—	—	—	—
305	CI23050 Direct Red 46	—	—	—	—	—
306	CI23155 Direct Blue 98	006656037	—	—	—	—
307	CI23266 Acid Red 111	006358572	—	—	—	—
308	CI23285 Acid Red 99	003701404	—	—	—	—
309	CI23365 Direct Orange 6	—	—	—	—	—
310	CI23370 Direct Orange 10	—	—	—	—	—
311	CI23375 Direct Orange 6	—	—	—	—	—
312	CI23500 Direct Red 2	000992596	—	—	—	—
313	C123630 Direct Red 39	—	—	—	—	—
314	CI23635 Acid Red 114	006459945	—	—	—	—
315	CI23790 Direct Blue 25	002150541	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	540/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	29.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	152/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	61.4/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	96.4/1973	—	—
Ditto	4	Ditto	—	56.8/1973	—	—
Ditto	4	Ditto	—	255/1973	—	—
Ditto	4	Ditto	—	22.3/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
316	CI23850 Direct Blue 14	000072571 (L66J BQ DSWQ HSWQ JZ CNUNR B D-2 &-NA-4)	—	TDLo:25 mg/kg/(8D preg), TFX: TER scu-mus LD50:267 mg/kg, scu-mus	—	TDLo:825 mg/kg/65WI, TFX:CAR scu-rat
317	CI23900 Acid Yellow 44	002429767	—	—	—	—
318	CI23910 Acid Red 89	006472500	—	—	—	—
319	CI24065 Direct Blue 136	—	—	—	—	—
320	CI24100 Direct Red 7	002868759	—	—	—	—
321	CI24125 Acid Red 128	—	—	—	—	—
322	CI24140 Direct Blue 8	002429712	—	—	—	—
323	CI24175 Direct Blue 151	006449350	—	—	—	—
324	CI24280 Direct Blue 22	002586574	—	—	—	—
325	CI24400 Direct Blue 15	002429745	—	—	—	—
326	CI24401 Direct Blue 218	—	—	—	—	—
327	CI24410 Direct Blue 1	002610051	—	—	—	—
328	CI24411 Direct Blue 76	016143796	—	—	—	—
329	CI24810 Acid Red 134	006459694	—	—	—	—
330	CI24890 Direct Yellow 4	003051114	—	—	—	—
331	CI24895 Direct Yellow 12	002870328	—	—	—	—
332	CI25040 Direct Black 71	—	—	—	—	—
333	CI25100 Mordant Yellow 16	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	2)330, 774
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	20.0/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	669/1973	—	—
Ditto	4	Ditto	—	117/1973	—	—
Ditto	4	Ditto	—	35.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	273/1973	—	—
Ditto	4	Ditto	—	91.4/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
334	CI25135 Acid Yellow 38	—	—	—	—	—
335	CI25200 Direct Orange 73	—	—	—	—	—
336	CI25275 Direct Red 120	—	—	—	—	—
337	CI25300 Direct Yellow 26	002829427	—	—	—	—
338	CI25380 Direct Red 75	002829438	—	—	—	—
339	CI25400 Direct Violet 62	007198994	—	—	—	—
340	CI25410 Direct Violet 47	—	—	—	—	—
341	CI26070 Disperse Yellow 23	006250233	—	—	—	—
342	CI26100 D&C Yellow 17	000085869	—	—	—	—
343	CI26105 Solvent Red 24	000085836 (L66J BNUNR B DNUNR B&& CQ)	—	—	—	TDLo:512 mg/kg/ 58WI, TFX:CAR scu-rat
344	CI26120 Solvent Red 26	004477796	—	—	—	—
345	CI26125 Solvent Red 27	001320065	—	—	—	—
346	CI26150 Solvent Black 113	004197255	—	—	—	—
347	CI26207 Acid Red 350	—	—	—	—	—
348	CI26360 Acid Blue 113	003351051	—	—	—	—
349	CI26370 Acid Black 24	003071736	—	—	—	—
350	CI26400 Acid Blue 120	003529019	—	—	—	—
351	CI26410 Acid Blue 118	006406322	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	55/1973	—	—
Ditto	4	Ditto	—	41.4/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	14.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	96.8/1973	—	—
Ditto	4	Ditto	—	339/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	96.8/1973	—	2)330, 781
Ditto	4	Ditto	—	93.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	382/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	46.8/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
352	CI26520 Mordant Orange 6	003564270	—	—	—	—
353	CI26550 Acid Orange 51	—	—	—	—	—
354	CI26900 Acid Red 151	—	—	—	—	—
355	CI26905 Acid Red 66	004196990	—	—	—	—
356	CI27070 Acid Black 26	—	—	—	—	—
357	CI27075 Acid Black 26	—	—	—	—	—
358	CI27200 Acid Red 115	006226808	—	—	—	—
359	CI27290 Acid Red 73	005413752	—	—	—	—
360	CI27680 Direct Red 16	006227027	—	—	—	—
361	CI27700 Direct Black 17	002945962	—	—	—	—
362	CI27720 Direct Black 51	034977634	—	—	—	—
363	CI27855 Direct Violet 7	—	—	—	—	—
364	CI27885 Direct Violet 9	006227141	—	—	—	—
365	CI27905 Direct Violet 51	005489770	—	—	—	—
366	CI27925 Direct Blue 67	003354970	—	—	—	—
367	CI28160 Direct Red 81	002610119	—	—	—	—
368	CI28210 Direct Red 153	—	—	—	—	—
369	CI28215 Direct Red 127	—	—	—	—	—
370	CI28230 Direct Red 117	—	—	—	—	—
371	CI28240 Direct Black 127	—	—	—	—	—
372	CI28255 Direct Orange 74	006104569	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	58.2/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	530/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	23.6/1973	—	—
Ditto	4	Ditto	—	119/1973	—	—
Ditto	4	Ditto	—	41.4/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	68.2/1973	—	—
Ditto	4	Ditto	—	5.5/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	337/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
373	CI28280 Direct Green 38	—	—	—	—	—
374	CI28360 Direct Red 152	—	—	—	—	—
375	CI29000 Direct Yellow 44	—	—	—	—	—
376	CI29005 Direct Yellow 41	—	—	—	—	—
377	CI29025 Direct Yellow 50	003214479	—	—	—	—
378	CI29060 Direct Yellow 34	006420333	—	—	—	—
379	CI20965 Direct Red 79	001937344	—	—	—	—
380	CI29090 Direct Orange 83	—	—	—	—	—
381	C129100 Direct Red 31	005001729	—	—	—	—
382	CI29105 Direct Violet 14	—	—	—	—	—
383	CI29110 Direct Red 149	—	—	—	—	—
384	CI29120 Direct Violet 66	—	—	—	—	—
385	CI29125 Direct Violet 48	—	—	—	—	—
386	CI29150 Direct Orange 26	003626366	—	—	—	—
387	CI29155 Direct Orange 29	006420402	—	—	—	—
388	CI29156 Direct Orange 102	—	—	—	—	—
389	CI29160 Direct Red 23	003441143	—	—	—	—
390	CI29165 Direct Red 4	006420413	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	459/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	113/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	40.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	20.0/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	43.2/1973	—	—
Ditto	4	Ditto	—	117/1973	—	—
Ditto	4	Ditto	—	115/1973	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
391	CI29166 Direct Brown 112	—	—	—	—	—
392	CI29175 Direct Red 62	—	—	—	—	—
393	CI29180 Direct Red 73	—	—	—	—	—
394	CI29185 Direct Red 24	006420446	—	—	—	—
395	CI29190 Direct Red 26	003687807	—	—	—	—
396	CI29200 Direct Red 72	—	—	—	—	—
397	CI29210 Direct Red 122	006420468	—	—	—	—
398	CI29225 Direct Red 83	015418163	—	—	—	—
399	CI20015 Direct Black 78	—	—	—	—	—
400	CI30045 Direct Brown 1	003811710	—	—	—	—
401	CI30120 Direct Brown 154	006360549	—	—	—	—
402	CI30140 Direct Brown 6	002893803	—	—	—	—
403	CI30145 Direct Brown 95	016071866	—	—	—	—
404	CI30220 Direct Green 39	—	—	—	—	—
405	CI30235 Direct Black 38	001937377	—	—	—	—
406	CI30245 Direct Black 4	002429836	—	—	—	—
407	CI30280 Direct Green 1	003626286	—	—	—	—
408	Ci30295 Direct Green 6	004335095	—	—	—	—
409	CI30315 Direct Green 8	005422173	—	—	—	—
410	CI31560 Direct Black 9	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	182/1973	—	—
Ditto	4	Ditto	—	98.6/1973	—	—
Ditto	4	Ditto	—	165/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	74.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	258/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	3.065/1973	—	—
Ditto	4	Ditto	—	75.0/1973	—	—
Ditto	4	Ditto	—	85.9/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
411	CI31565 Direct Black 9	—	—	—	—	—
412	CI31575 Direct Black 2	—	—	—	—	—
413	CI31600 Direct Black 80	008003698	—	—	—	—
414	CI31665 Direct Black 36	—	—	—	—	—
415	CI31930 Direct Blue 26	—	—	—	—	—
416	CI34010 Direct Blue 126	008006051	—	—	—	—
417	CI34015 Direct Brown 32	—	—	—	—	—
418	CI34045 Direct Green 26	006388267	—	—	—	—
419	CI34085 Direct Blue 120	003626402	—	—	—	—
420	CI34090 Direct Blue 120A	003626300	—	—	—	—
421	CI34140 Direct Blue 71	004399557	—	—	—	—
422	CI34146 Direct Blue 74	033540942	—	—	—	—
423	CI34215 Direct Black 56	—	—	—	—	—
424	CI34200 Direct Blue 78	002503733	—	—	—	—
425	CI34215 Direct Blue 81	006252579	—	—	—	—
426	CI34220 Direct Blue 75	—	—	—	—	—
427	CI34260 Direct Green 51	—	—	—	—	—
428	CI35005 Direct Brown 44	006252626	—	—	—	—
429	CI35255 Direct Black 19	006428315	—	—	—	—
430	CI35435 Direct Black 22	—	—	—	—	—
431	CI35660 Direct Brown 31	002429814	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	313/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	42.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	59.6/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	47.7/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	39.6/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
432	CI35760 Direct Red 84	—	—	—	—	—
433	CI35780 Direct Red 80	002610108	—	—	—	—
434	CI35790 Direct Red 32	033448689	—	—	—	—
435	CI35870 Direct Black 75	002679494	—	—	—	—
436	CI36200 Direct Brown 106	—	—	—	—	—
437	CI36300 Direct Brown 74	—	—	—	—	—
438	CI3700 Base Azoic Diazoic 44	—	—	—	—	—
439	CI3700 Salt Axoic Diazoic 44	—	—	—	—	—
440	CI37005 Salt Azoic Diazoic 2	—	—	—	—	—
441	CI37005 Base Azoic Diazoic 2	—	—	—	—	—
442	CI37010 Base Azoic Diazoic 3	—	—	—	—	—
443	CI37010 Salt Azoic Diazoic 3	—	—	—	—	—
444	CI37010 Azoic Brown 3	—	—	—	—	—
445	CI37010 Azoic Orange 3	—	—	—	—	—
446	CI37025 Salt Azoic Diazoic 6	000088744 (ZR BNW)	535 rat	—	—	—
447	CI37035 Salt Azoic Diazoic 37	000100016 (ZR DNW)	3249 rat	LDLo:40 mg/kg ivn-man	USOS air: TWA 1 ppm	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	297/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	153/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	37.3/1973	—	—
Ditto	4	Ditto	—	—	—	2)330, 111
Ditto	4	Ditto	—	—	—	2)330, 111

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
448	CI37040 Salt Azoic Diazoic 9	000089634 (ZR DG BNWZR DG BNW)	—	LD50:63 mg/kg, ivn-mus	—	—
449	CI37050 Azoic Orange 10	000121506 (ZR BG EXFFF)	—	LDLo:100 mg/kg, ipr-mus	—	—
450	CI37050 Salt Azoic Diazoic 49	—	—	—	—	—
451	CI37080 Base Azoic Diazoic 46	—	—	—	—	—
452	CI37085 Base Azoic Diazoic 11	003165933 (ZR DG B &GH)	—	LD50:560 mg/kg, ipr-rat	—	—
453	CI37085 Salt Azoic Diazoic 11	003165933*	—	—	—	—
454	CI37090 Salt Azoic Diazoic 32	—	—	—	—	—
455	CI37090 Base Azoic Diazoic 32	—	—	—	—	—
456	CI37090 Azoic Red 1	—	—	—	—	—
457	CI37090 Azoic Yellow 3	—	—	—	—	—
458	CI37090 Azoic Red 6	—	—	—	—	—
459	CI37090 Azoic Yellow 1	—	—	—	—	—
460	CI37100 Azoic Red 16	—	—	—	—	—
461	CI37100 Base Azoic Diazoic 34	—	—	—	—	—
462	CI37100 Base Azoic Diazoic 34	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	97.3/1973	—	2)330, 106
Ditto	4	Ditto	—	—	—	2)330, 1143
Ditto	4	Ditto	—	26.8/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	2)330, 1143
Ditto	4	Ditto	—	—	—	Ditto
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	137/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	77.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
463	CI37105 Salt Azoic Diazoic 12	—	—	—	—	—
464	CI37105 Base Azoic Diazoic 12	—	—	—	—	—
465	CI37107 Azoic Coupling 107	—	—	—	—	—
466	CI37110 Base Acoid Diazoic 8	—	—	—	—	—
467	CI37110 Salt Azoic Diazoic 8	—	—	—	—	—
468	CI37120 Salt Azoic Diazoic 10	—	—	—	—	—
469	CI37120 Base Azoic Diazoic 10	—	—	—	—	—
470	CI37120 Azoic Brown 10	—	—	—	—	—
471	CI37120 Azoic Red 2	—	—	—	—	—
472	CI37120 Azoic Brown 7	—	—	—	—	—
473	CI37120 Azoic Yellow 2	—	—	—	—	—
474	CI37125 Base Azoic Diazoic 5	—	—	—	—	—
475	CI37125 Salt Azoic Diazoic 5	—	—	—	—	—
476	CI37130 Base Azoic Diazoic 13	—	—	—	—	—
477	CI37130 Salt Azoic Diazoic 13	—	—	—	—	—
478	CI37135 Salt Azoic Diazoic 1	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10³ kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	164/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	45.0/1973	—	—
Ditto	4	Ditto	—	15.5/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	9.1/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	153/1973	—	—
Ditto	4	Ditto	—	—	—	—
1 Ditto	4	Ditto	—	166/1973	—	—
Ditto	4	Ditto	—	108/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
479	CI37150 Azoic Red 12	—	—	—	—	—
480	CI37150 Salt Azoic Diazoic 42	—	—	—	—	—
481	CI37151 Salt Azoic Diazoic 14	—	—	—	—	—
482	CI37151 Salt Azoic Diazoic 28	—	—	—	—	—
483	CI37151 Base Azoic Diazoic 14	—	—	—	—	—
484	CI37151 Base Azoic Diazoic 28	—	—	—	—	—
485	CI37155 Azoic Diazoic 24	—	—	—	—	—
486	CI37155 Azoic Blue 7	—	—	—	—	—
487	CI37165 Azoic Violet 1	—	—	—	—	—
488	CI37165 Salt Azoic Diazoic 41	—	—	—	—	—
489	CI37175 Salt Azoic Diazoic 20	—	—	—	—	—
490	CI37175 Azoic Blue 6	—	—	—	—	—
491	CI37175 Azoic Green 1	—	—	—	—	—
492	CI37185 Azoic Diazoic 0	006232571*	—	—	—	—
493	CI37185 Disperse Black 2	006232571	—	—	—	—
494	CI37210 Base Azoic Diazoic 4	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
495	CI37235 Base Azoic Diazoic 48	00119904* (WLN 1OR BZ E-2)	1920 rat	—	—	TDLo:13 gm/kg/ 52WI TFX:NEO orl-rat
496	CI37235 Salt Azoic Diazoic 48	Ditto	—	—	—	Ditto
497	CI37235 Disperse Black 6	Ditto	—	—	—	Ditto
498	CI37255 Salt Azoic Diazoic 35	—	—	—	—	—
499	CI37275 Salt Azoic Diazoic 36	—	—	—	—	—
500	CI37505 Azoic Coupling 2	—	—	—	—	—
501	CI37505 Azoic Blue 7	—	—	—	—	—
502	CI37505 Azoic Blue 6	—	—	—	—	—
503	CI37505 Azoic Violet 1	—	—	—	—	—
504	CI37505 Azoic Orange 10	—	—	—	—	—
505	CI37510 Azoic Coupling 10	—	—	—	—	—
506	CI37515 Azoic Coupling 17	—	—	—	—	—
507	CI37520 Azoic Coupling 18	—	—	—	—	—
508	CI37520 Azoic Red 16	—	—	—	—	—
509	CI37520 Azoic Red 6	—	—	—	—	—
510	CI37525 Azoic Coupling 8	—	—	—	—	—
511	CI37526 Azoic Coupling 21	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	77.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	43.2/1973	—	—

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
512	CI37527 Azoic Coupling 29	—	—	—	—	—
513	CI37530 Azoic Coupling 20	—	—	—	—	—
514	CI37530 Azoic Red 2	—	—	—	—	—
515	CI37531 Azoic Coupling 34	—	—	—	—	—
516	CI37535 Azoic Coupling 11	—	—	—	—	—
517	CI37540 Azoic Coupling 24	—	—	—	—	—
518	CI37545 Azoic Coupling 19	—	—	—	—	—
519	CI37550 Azoic Coupling 12	—	—	—	—	—
520	CI37550 Azoic Red 12	—	—	—	—	—
521	CI37550 Azoic Brown 10	—	—	—	—	—
522	CI37558 Azoic Red 1	—	—	—	—	—
523	CI37558 Azoic Orange 3	—	—	—	—	—
524	CI37558 Azoic Yellow 3	—	—	—	—	—
525	CI37558 Azoic Coupling 14	—	—	—	—	—
526	CI37560 Azoic Coupling 4	—	—	—	—	—
527	CI37565 Azoic Coupling 7	—	—	—	—	—
528	CI37575 Azoic Coupling 3	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	9.1/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	137/1973	—	—
Ditto	4	Ditto	—	37.3/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
529	CI37585 Azoic Coupling 36	—	—	—	—	—
530	CI37585 Azoic Green 1	—	—	—	—	—
531	CI37595 Azoic Coupling 13	—	—	—	—	—
532	CI37600 Azoic Coupling 15	—	—	—	—	—
533	CI37600 Acoid Brown 3	—	—	—	—	—
534	CI37600 Azoic Brown 7	—	—	—	—	—
535	CI37605 Azoic Coupling 16	—	—	—	—	—
536	CI37610 Azoic Coupling 5	—	—	—	—	—
537	CI37610 Azoic Yellow 3	—	—	—	—	—
538	CI37610 Azoic Yellow 2	—	—	—	—	—
539	CI37610 Azoic Yellow 1	—	—	—	—	—
540	CI37615 Azoic Coupling 35	—	—	—	—	—
541	CI40000 Direct Yellow 11	001325377	—	—	—	—
542	CI40001 Direct Yellow 6	001325388	—	—	—	—
543	CI40002 Direct Orange 15	—	—	—	—	—
544	CI40003 Direct Orange 15	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10³ kg/year	Uses	References
Diazotization Coupling	4	**Water:** inorganic salts	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	9.1/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Condensation Precipitation Filtration	5	—	—	1.220/1973	—	—
Condensation Precipitation Reduction Filtration	5	**Water:** brines containing small amounts of organic materials		265/1973	—	—
Ditto	5	Ditto	—	Ditto	—	—
Condensation Precipitation Filtration	5	Ditto	—	57.3/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
545	CI40045 Direct Yellow 21	—	—	—	—	—
546	CI40210 Direct Orange 61	—	—	—	—	—
547	CI40215 Direct Orange 39	001325548	—	—	—	—
548	CI40215 Direct Orange 34	001325548	—	—	—	—
549	CI40220 Direct Orange 34	—	—	—	—	—
550	CI40260 Direct Orange 37	—	—	—	—	—
551	CI40265 Direct Orange 37	—	—	—	—	—
552	CI40290 Direct Red 111	—	—	—	—	—
553	CI40300 Direct Yellow 106	—	—	—	—	—
554	CI40600 Fluorescent Brightener 30	002606931	—	—	—	—
555	CI40621 Fluorescent Brightener 9	000133664	—	—	—	—
556	CI40622 Fluorescent Brightener 28	004404437	—	—	—	—
557	CI40630 Fluorescent Brightener 1	015339396	—	—	—	—
558	CI40645 Fluorescent Brightener 46	006416688	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Precipitation Filtration	5	Water: brines containing small amounts of organic materials	——	57.3/1973	——	——
——	5	Ditto	——	——	——	——
——	5	Ditto	——	57.3/1973	——	——
——	5	Ditto	——	46.8/1973	——	——
——	5	Ditto	——	Ditto	——	——
——	5	Ditto	——	11.8/1973	——	——
——	5	——	——	Ditto	——	——
Condensation Precipitation Filtration	5	Water: brines containing small amounts of organic materials	——	——	——	——
Ditto	5	Ditto	——	336/1973	——	——
Ditto	5	Ditto	——	——	——	——
Condensation Reduction	5	Ditto	——	——	——	——
Ditto	5	Ditto	——	523/1973	——	——
Ditto	5	Ditto	——	——	——	——
Condensation Oxidation Filtration	5	Ditto	——	——	——	——

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
559	CI41000 Basic Yellow 2	002465272 (1N1&R D2YUM &GH)	150 cat	—	—	TDLo:40 gm/kg/ 87 WC, TFX:CAR orl-rat
560	CI41000 Solvent Yellow 34	000492808	—	—	—	TDLo:29 gm/kg/ 52WC, TFX:CAR orl-mus
561	CI41001 Basic Yellow 37	006358367	—	—	—	—
562	CI42000 Basic Green 4	000569642 (L6Y DYJ AUYR&R DN1&1& DUK &G &25/28)	LDLo:75 mg/kg rbt	—	—	—
563	CI42000 PTA Pigment Green 4	000569642*	—	—	—	—
564	CI42000 PMA Pigment Green 4	Ditto	—	—	—	—
565	CI42000 Solvent Green 1	Ditto	—	—	—	—
566	CI42025 Pigment Basic Blue 2	003521060*	—	—	—	—
567	CI42025 PTA Pigment Blue 9	003521060*	—	—	—	—
568	CI42025 PMA Pigment Blue 9	Ditto	—	—	—	—
569	CI42025 Basic Blue 2	Ditto	—	—	—	—
570	CI42025 Basic Blue 1	003521060	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Filtration Precipitation	6,18	**Water:** brines contaminated with small amounts of organic materials, residual amounts of metal ions and lead sulfate	—	—	—	2)330, 110
—	Ditto	—	—	—	—	Ditto
—	Ditto	—	—	—	—	—
Condensation Oxidation Crystallization Filtration	6	**Water:** brines contaminated with small amounts of organic materials. Also, lead sulfate is precipitated as a solid waste	—	312/1973	—	2)330, 77
Ditto	6	Ditto	—	—	—	Ditto
Ditto	6	Ditto	—	—	—	Ditto
Ditto	6	Ditto	—	—	—	Ditto
Condensation Oxidation Crystallization Precipitation Filtration	6,18	**Water:** brines contaminated with small amounts of organic materials, residual amounts of metal ions and lead sulfate	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
571	CI42040 Basic Green 1	000633034 (L6Y DYJ AUYR&R DN2&2& DUK 2&2 &WSQ O &25/34	LDLo:25 mg/kg mus	—	—	—
572	CI42040 PTA Pigment Green 1	000633034*	—	—	—	—
573	CI42040 PMA Pigment Green 1	Ditto	—	—	—	—
574	CI42040 PTA Pigment Green 2	Ditto	—	—	—	—
575	CI42040 PMA Pigment Green 2	Ditto	—	—	—	—
576	CI42045 Acid Blue 1	000129179	—	LD50:1200 mg/kg ivn-mus	—	LDLo:6500 mg/kg/ 33WI, TFX:NEO scu-rat
577	CI42053 FD&C Green 3	002353459 (WSO&R DIN2&R D- 2V*R DQ BSWO &-NA- 2)	—	—	—	TDLo:5925 mg/kg/ 48WI TFX:CAR, scu-rat
578	CI42080 Acid Blue 7	003486304	—	—	—	—
579	CI42085 Acid Green 3	004680788 (WSO&R D1N2&R D2Y*R &-NA-)	—	—	—	TDLo:600 mg/kg/ 43WC, TFX:CAR orl-rat
580	CI42090 Acid Blue 9	002650182 (L6Y DYJ AUYR BSWOR DN2&1R CSWQ&& DUK2&1R CSWQ &ZH &ZH &37/17)	—	LD50:4600 mg/kg, scu-mus	—	TDLo:17 gm/kg/ 2YI, TFX:CAR scu-rat
581	CI42090 Lake Pigment Blue 24	002650182*	—	Ditto	—	Ditto

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Crystallization Oxidation Precipitation Filtration	6,8	See above item	—	38.2/1973	—	2)75, 330
Ditto	Ditto	Ditto	—	—	—	Ditto
Ditto	Ditto	Ditto	—	2.7/1973	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	30.5/1973	—	—
Ditto	Ditto	Ditto	—	—	—	2)330, 421
Condensation Crystallization Precipitation Oxidation Filtration Sulfonation	6	Water: brines contaminated with small amounts of organic materials, and lead sulfate is precipitated as a solid waste	—	—	—	—
Condensation Crystallization Oxidation Filtration	6	Ditto	—	—	—	—
Ditto	6	Ditto	—	93.6/1973	—	2)330, 80
Ditto	6,18	Ditto	—	971/1973	—	Ditto
Ditto	6	Ditto	—	—	—	Ditto

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
582	CI42090 FD&C Blue 1	002650182	—	See above item	—	See above item
583	CI42095 Acid Green 5	005141208 (WSO&R D1N2&R D-2Y*R DSWO &-NA- 2)	—	—	—	TDLo:1290 gm/kg/ 86WC, TFX:CAR orl-rat
584	CI42100 Acid Green 9	004857812	—	—	—	—
585	CI42140 Basic Blue 5	003943826	—	—	—	—
586	CI42170 Acid Green 22	005863514	—	—	—	—
587	CI45170 PTA Pigment Violet 1	001326030*	—	—	—	—
588	CI42500 Basic Red 9	000548618	—	—	—	—
589	CI42510 Basic Violet 14	000632995	—	—	—	—
590	CI42510 PMA Pigment Violet 9	000632995*	—	—	—	—
591	CI42510 Solvent Red 41	003248939	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See above item	6	See above item	—	83.2/1973	—	2)330, 80
Condensation Precipitation Oxidation Filtration Sulfonation	6	Ditto	—	—	—	Ditto
Condensation Crystallization Oxidation Filtration	6	Ditto	—	—	—	—
Condensation Crystallization Oxidation Filtration Precipitation	6,18	**Water:** brines contaminated with small amounts of organic materials residual amounts of metal ions and lead sulfate	—	7.3/1973	—	—
Condensation Crystallization Oxidation Filtration	6	**Water:** brines contaminated with small amounts of organic materials and lead sulfate is precipitated as a solid waste	—	—	—	—
Precipitation Filtration Condensation	11,18	Ditto	—	52.3/1973	—	—
Oxidation Filtration	7	**Air:** possibly significant and hazardous amounts of toxic arylamines **Water:** brines contaminated with varying amounts of organic substances **Solids:** sludges containing large amounts of metal ions	—	—	—	—
Ditto	7	Ditto	—	—	—	—
Ditto	7	Ditto	—	—	—	—
Ditto	7	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
592	CI42520 Basic Violet 2	003248917	—	—	—	—
593	CI42535 Basic Violet 1	008004873	—	—	—	—
594	CI42535 PTA Pigment Violet 3	008004873*	—	—	—	—
595	CI42535 PMA Pigment Violet 3	Ditto	—	—	—	—
596	CI42535 Solvent Violet 8	Ditto	—	—	—	—
597	CI42536 Basic Violet 13	—	—	—	—	—
598	CI42555 Basic Violet 3	000548629 (1N1&R D-3Y* &G)	1000 rat	LDLo:15 mg/kg ipr-rat	—	—
599	CI42555 Solvent Violet 9	00054629*	1000 rat	Ditto	—	—
600	CI42561 Acid Blue 34	006460055	—	—	—	—
601	CI42595 Basic Blue 7	002390605	—	—	—	—
602	CI42595 Solvent Blue 5	001325866	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Oxidation Filtration	7	See item above	—	—	—	—
Oxidation Filtration Benzylation	7	Ditto	—	555/1973	—	—
Ditto	7	Ditto	—	18.2/1973	—	—
Ditto	7	Ditto	—	191/1973	—	—
Ditto	7	Ditto	—	—	—	—
Ditto	7	Ditto	—	—	—	—
Condensation Filtration Precipitation	8,18	Air: small amounts of phosgene **Water:** lead sulfate precipitate and brine which contains lead and small amounts of organic materials and residual amounts of metal ions	—	—	—	2)330, 73
Ditto	Ditto	Ditto	—	—	—	Ditto
Condensation Filtration Sulfonation	8	**Air:** See 598 **Water:** lead sulfate precipitate and brine which contains lead and small amounts of organic materials	—	—	—	—
Condensation Crystallization Oxidation Filtration Precipitation	6,8	**Water:** brines contaminated with small amounts of organic materials, residual amounts of metal ions & lead surfate	—	78.2/1973	—	—
Ditto	Ditto	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
603	CI42595 PTA Pigment Blue 1	001325877*	—	—	—	—
604	CI42595 PMA Pigment Blue 1	001325877*	—	—	—	—
605	CI42600 PTA Pigment Blue 14	002390592*	—	—	—	—
606	CI42600 PMA Pigment Blue 14	002390592*	—	—	—	—
607	CI42600 Basic Violet 4	002390592	—	—	—	—
608	CI42640 Acid Violet 49	001694093	—	—	—	TDLo:9400 mg/kg/ 2YI, TFX:NEO scu-rat
609	CI42640 FD&C Violet 1	001694093	—	—	—	Ditto
610	CI42645 Acid Blue 15	005863467	—	—	—	—
611	CI42650 Acid Violet 17	004129844	—	—	—	—
612	CI42655 Acid Blue 90	006104581	—	—	—	—
613	CI42660 Acid Blue 83	006104592	—	—	—	—
614	CI42735 Acid Blue 104	006505302	—	—	—	—
615	CI42735 Lake Acid Blue 104	006505302*	—	—	—	—
616	CI42750 Pigment Blue 19	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See item above	6,18	See item above	—	—	—	—
Ditto	Ditto	Ditto	—	45.9/1973	—	—
Condensation Filtration Precipitation	8,18	See Item 598	—	—	—	—
Ditto	8,18	Ditto	—	—	—	—
Ditto	8,18	Ditto	—	—	—	—
Precipitation Filtration	18	Water: brines may also contain residual amounts of metal ions	—	26.4/1973	—	2)330, 77
Ditto	18	Ditto	—	—	—	Ditto
—	—	—	—	—	—	—
See Item 608	18	See Item 608	—	13.2/1973	—	—
Condensation Oxidation Precipitation Filtration Sulfonation	6	Water: brines contaminated with small amounts of organic materials and lead sulfate is precipitated as a solid waste	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
Precipitation Filtration	18	Water: brines may also contain residual amounts of metal ions	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV*	Carcinogen
617	CI42760 Solvent Blue 23	002152649	—	—	—	—
618	CI42775 Solvent Blue 3	—	—	—	—	—
619	CI42780 Acid Blue 93	028983564	—	—	—	—
620	CI43820 Mordant Blue 3	003564189	—	—	—	—
621	CI43830 Mordant Blue 1	001796925	—	—	—	—
622	CI44025 Acid Green 16	001325446	—	—	—	—
623	CI44040 Basic Blue 11	002185866	—	—	—	—
624	CI44040 Solvent Blue 6	006786841	—	—	—	—
625	CI44040 PTA Pigment Blue 10	002185866*	—	—	—	—
626	CI44040 PMA Pigment Blue 10	002185866*	—	—	—	—
627	CI44045 PTA Pigment Blue 2	002580565*	—	—	—	—
628	CI44045 PMA Pigment Blue 2	Ditto	—	—	—	—
629	CI44045 Solvent Blue 4	006786830	—	—	—	—
630	CI44045 Basic Blue 26	002580565	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Filtration Oxidation	7	See Item 588	—	—	—	—
Ditto	7	Ditto	—	—	—	—
—	-	—	—	—	—	—
Condensation Oxidation Filtration	9	**Air:** noxious gas emissions from use of nitrogen oxides **Water:** brines containing small amounts of organic materials	—	—	—	—
Ditto	9	Ditto	—	—	—	—
Condensation Oxidation	8	See Item 600	—	37.7/1973	—	—
Condensation Oxidation Nitrosation Hydrolysis Precipitation Filtration	10,18	**Air:** nitrogen oxides and formaldehyde **Water:** brines containing heavy metal ions **Solids:** distillation residues and precipitated lead surfate	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	13.2/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
631	CI44090 Acid Green 50	003087169	2000 rat	—	—	TDLo:270 gm/kg/30WI TFX:CAR, scu-rat
632	CI45100 Acid Red 52	003520421	—	—	—	—
633	CI45160 Basic Red 1	000989388	—	—	—	—
634	CI45160 PTA Pigment Red 81	00989388*	—	—	—	—
635	CI45160 PMA Pigment Red 81	Ditto	—	—	—	—
636	CI45170 PMA Pigment Violet 1	001326030*	—	—	—	—
637	CI45170 Solvent Red 49	000509342	—	—	—	—
638	CI45170 Solvent Red 35	000081889	—	—	—	—
639	CI45170 FD&C Red 37	000509342	—	—	—	—
640	CI45170 FD&C Red 19	000081889	—	—	—	—
641	CI45170 Basic Violet 10	000081889	—	—	—	—
642	CI45175 Basic Violet 11	002390638	—	—	—	—
643	CI45180 Mordant Red 27	006359224	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Oxidation	8	See Item 600	—	—	—	2)22, Splmnt
Condensation Cyclization Oxidation	11	**Water:** brines contaminated with small amounts of organic chemicals **Solid:** sludge of iron oxide	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	42.7/1973	—	—
—	—	—	—	294/1973	—	—
Precipitation Filtration Condensation	11,18	**Water:** brines contaminated with small amounts of organic chemicals and residual amounts of metal ions **Solid:** See Item 632	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	143/1973	—	—
Precipitation Filtration Condensation Esterification	Ditto	Ditto	—	—	—	—
Condensation	11	**Water:** brines contaminated with small amounts of organic chemicals **Solid:** sludge of iron oxide	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
644	CI45350 D&C Yellow 7	000518456 (T C666 BO EVJ TR BVQ& MQ)	LDLo:2500 mg/kg rbt	—	—	—
645	CI45350 D&C Yellow 8	000518478 (T C666 BO EVJ TR BO& MO &-NA- 2)	—	LD50:1700 mg/kg, ipr-rat	—	—
646	CI45350 Acid Yellow 73	Ditto	—	Ditto	—	—
647	CI45370 D&C Orange 5	000596032*	—	—	—	—
648	CI45380 D&C Red 22	000548265 (T C666 BO EVJ DE FE IR BVO& LE MO NE &-NA- 2)	—	LDLo:500 mg/kg, ipr-rat	—	TDLo:7200 mg/kg/44WI, TFX:NEO scu-rat
649	CI45380 Acid Red 87	Ditto	—	Ditto	—	Ditto
650	CI45380 Pigment Red 90	015086949*	—	—	—	—
651	CI45380 D&C Red 21	015086949	—	—	—	—
652	CI45410 D&C Red 27	001847287*	—	—	—	—
653	CI45410 D&C Red 28	001847287	—	—	—	—
654	CI45425 D&C Orange 10	033239199*	—	—	—	—
655	CI45430 D&C Red 3	000568638 (T C666 BO EVJ DI FI IR BVO& LI MO NI &-NA- 2)	1895 rat	LDLo:200 mg/kg ivn-rat	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See item above	11	See item above	—	—	—	2)330, 557
Ditto	11	Ditto	—	—	—	Ditto
Ditto	11	Ditto	—	—	—	Ditto
Precipitation Filtration Halogenation	12,18	Water: hydrogen halide and small amounts of highly colored products & residual amounts of metal ions	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	2)330, 557
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	720/1973	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Ditto	Ditto	Ditto	—	155/1973	—	2)330, 558

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
656	CI46005 Basic Orange 14	000065612	—	—	—	—
657	CI46500 Pigment Violet 19	001047161	—	—	—	—
658	CI4700 D&C Yellow 11	008003223	—	—	—	—
659	CI47000 Solvent Yellow 33	008003223	—	—	—	—
660-	CI47005 D&C Yellow 10	008004920	—	—	—	—
661	CI47005 Acid Yellow 3	008004920	—	—	—	—
662	CI47020 Disperse Yellow 54	012223857	—	—	—	—
663	CI47023 Disperse Yellow 64	012223868	—	—	—	—
664	CI47035 Direct Yellow 5	—	—	—	—	—
665	CI4800 Disperse Yellow 31	004361846	—	—	—	—
666	CI48013 Basic Violet 16	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Oxidation Condensation Nitration Reduction Cyclization	10	See Item 623	—	—	—	—
Cyclization Halogenation Amination	13	**Water:** brines containing small amounts of organic chemicals **Solid:** acidic wastes	—	—	—	—
Condensation	14	**Water:** possibly brines contaminated with small amounts of organic materials	—	—	—	—
Ditto	14	Ditto	—	—	—	—
Condensation Sulfonation Precipitation Filtration	14,15, 18	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals and residual amounts of metal ions	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Condensation Sulfonation	14,15	Ditto	—	606/1973	—	—
Condensation	14	See Item 658	—	—	—	—
Condensation Sulfonation	14,15	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals	—	65.5/1973	—	—
Condensation Filtration	9	See Item 620	—	—	—	—
Condensation	16	**Water:** acidic brines containing small amounts of organic chemicals	—	216/1973	—	—

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
667	CI48015 Basic Red 13	003648360	—	—	—	—
668	CI48020 Basic Violet 7	006441823	—	—	—	—
669	CI48035 Basic Orange 21	003056937	—	—	—	—
670	CI48040 Basic Orange 22	004657005	—	—	—	—
671	CI48055 Basic Yellow 11	004208804	—	—	—	—
672	CI48070 Basic Red 12	006320145	—	—	—	—
673	CI48100 Basic Yellow 23	—	—	—	—	—
674	CI49000 Direct Yellow 59	008064606	—	—	—	—
675	CI49005 Basic Yellow 1	002390547	—	—	—	—
676	CI49005 PMA Pigment Green 2	002390547	—	—	—	—
677	CI49005 PTA Pigment Green 2	002390547	—	—	—	—
678	CI49010 Direct Yellow 7	015724693	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation	16	See above item	—	13.6/1973	—	—
Ditto	16	Ditto	—	—	—	—
Ditto	16	Ditto	—	427/1973	—	—
Ditto	16	Ditto	—	—	—	—
Ditto	16	Ditto	—	755/1973	—	—
Ditto	16	Ditto	—	—	—	—
Ditto	16	Ditto	—	—	—	—
Methylation Sulfonation Dehydrogenation	17	Air: possibly hydrogen sulfide Water: dilute sulfuric acid and ammoniacal brine contaminated with small amounts of organic material	—	—	—	—
Methylation Sulfonation Dehydrogenation Precipitation Filtration	17,18	Air: see above Water: dilute sulfuric acid and ammoniacal brine contaminated with small amounts of organic materials and residual amounts of metal ions	—	—	—	—
Ditto	Ditto	Ditto	—	28.6/1973	—	—
Ditto	Ditto	Ditto	—	—	—	—
See Item 674	17	See Item 674	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
679	CI50204 Basic 0	—	—	—	—	—
680	CI50240 Basic Red 2	000477736	—	—	—	—
681	CI50400 Solvent Blue 7	008004986	—	—	—	—
682	CI50405 Acid Blue 20	—	—	—	—	—
683	CI50415 Solvent Black 5	012227804*	—	—	—	—
684	CI50415 Solvent Black 7	012227804	—	—	—	—
685	CI50420 Acid Black 2	012227815	—	—	—	—
686	CI51004 Basic Blue 4	002787919	—	—	—	—
687	CI51004 Basic Blue 3	002787919	—	—	—	—
688	CI51175 Basic Blue 6	000966621	—	—	—	—
689	CI51300 Direct Blue 106	006527704	—	—	—	—
690	CI51319 Pigment Violet 23	006358301	—	—	—	—
691	CI51320 Direct Blue 108	001324589	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation	19	Water: effluent would contain chloride, iron, & chromium ions, as well as small amounts of organic materials	—	—	—	—
Oxidation Precipitation Fractional	19	Ditto	—	—	—	—
Condensation	19	Ditto	—	—	—	—
Sulfonation Condensation	15,18	Water: dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals & residual amounts of metal ions	—	—	—	—
Condensation	19	See Item 679	—	—	—	—
Ditto	19	Ditto	—	—	—	—
Sulfonation	15	Water: dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals	—	—	—	—
Nitrosation Condensation	20	Water: brines containing small amounts of organic materials				
Ditto	20	Ditto	—	341/1973	—	—
Ditto	20	Ditto	—	—	—	—
Concensation Sulfonation	20	Ditto	—	—	—	—
Condensation Cyclization	20	Ditto	—	127/1973	—	—
Sulfonation	15	See Item 685	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
692	CI52015 Basic Blue 9	000061734 (T C666 BN ISJ FN1&1 LNI&1 & G &12/28	—	LDLo:100 mg/kg ivn-mus LD50:82 mg/kg ivn-mus	—	—
693	CI5300 Leuco Sulfur Brown 1	—	—	—	—	—
694	CI53001 Solubilized Sulfur Brown 1	—	—	—	—	—
695	CI53010 Leuco Sulfur Yellow 9	—	—	—	—	—
696	CI53040 Leuco Sulfur Yellow 1	—	—	—	—	—
697	CI53050 Sulfur Orange 1	—	—	—	—	—
698	CI53055 Sulfur Brown 10	—	—	—	—	—
699	CI53055 Leuco Sulfur Brown 10	—	—	—	—	—
700	CI53056 Solubilized Sulfur Brown 10	—	—	—	—	—
701	CI53090 Leuco Sulfur Brown 26	—	—	—	—	—
702	CI53090 Sulfur Brown 26	—	—	—	—	—
703	CI53120 Leuco Sulfur Yellow 2	—	—	—	—	—
704	CI53160 Sulfur Yellow 4	—	—	—	—	—
705	CI53160 Leuco Sulfur Yellow 4	—	—	—	—	—
706	CI53185 Leuco Sulfur Black 1	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Oxidation Cyclization Precipitation Filtration	21	**Water:** brine containing Mn, An, Al, & Cr ions	—	– –	—	2)330, 872
Baking Filtration	22	**Water:** brines containing inorganic sulfur compounds & small amounts of organic chemicals	– –	—	—	– –
Ditto	22	Ditto	– –	—	—	—
—	– –	—	– –	—	—	– –
See Item 693	22	See Item 693	– –	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	– –
—	—	– –	—	—	—	– –
See Item 693	22	See Item 693	– –	—	—	– –
Ditto	22	Ditto	—	—	—	– –
Ditto	22	Ditto	– –	– –	—	– –
Ditto	22	Ditto	– –	—	—	– –
Ditto	22	Ditto	—	—	– –	—
Ditto	22	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
707	CI53185 Sulfur Black 1	—	—	—	—	—
708	CI53186 Solubilized Sulfur Black 1	—	—	—	—	—
709	CI53190 Leuco Sulfur Black 10	—	—	—	—	—
710	CI53195 Sulfur Black 2	—	—	—	—	—
711	CI53195 Leuco Sulfur Black 2	—	—	—	—	—
712	CI53196 Solubilized Sulfur Black 2	—	—	—	—	—
713	CI53205 Sulfur Black 5	—	—	—	—	—
714	CI53228 Leuco Sulfur Red 10	—	—	—	—	—
715	CI53235 Sulfur Blue 5	—	—	—	—	—
716	CI53235 Leuco Sulfur Blue 1	—	—	—	—	—
717	CI53246 Leuco Sulfur Brown 14	—	—	—	—	—
718	CI53246 Sulfur Brown 14	—	—	—	—	—
719	CI53290 Leuco Sulfur Black 11	—	—	—	—	—
720	CI53320 Sulfur Brown 52	—	—	—	—	—
721	CI53325 Sulfur Brown 60	—	—	—	—	—
722	CI53440 Sulfur Blue 7	001327577	—	—	—	—
723	CI53440 Leuco Sulfur Blue 7	001327577	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See above item	22	See above item	—	—	—	—
—	—	—	—	—	—	—
Condensation	22	See Item 693	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
—	—	—	—	—	—	—
Condensation	22	See Item 693	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Baking Filtration	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
—	22	Ditto	—	—	—	—
—	22	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
724	CI53441 Solubilized Sulfur Blue 7	—	—	—	—	—
725	CI53450 Leuco Sulfur Blue 13	012262269	—	—	—	—
726	CI53570 Leuco Sulfur Green 3	—	—	—	—	—
727	CI53571 Leuco Sulfur Green 2	—	—	—	—	—
728	CI53571 Sulfur Green 2	—	—	—	—	—
729	CI53630 Vat Blue 43	—	—	—	—	—
730	CI53680 Leuco Sulfur Brown 20	—	—	—	—	—
731	CI53720 Sulfur Red 6	—	—	—	—	—
732	CI53721 Sulfur Brown 12	—	—	—	—	—
733	CI53830 Leuco Sulfur Red 5	—	—	—	—	—
734	CI53830 Sulfur Red 5	—	—	—	—	—
735	CI5800 Mordant Red 11	000072480	—	—	—	—
736	CI58000 Lake Pigment Red 83	000072480*	—	—	—	—
737	CI58005 Mordant Red 3	000130223	—	—	—	—
738	CI58055 PTA Pigment Blue 7	—	—	—	—	—
739	CI58055 PMA Pigment Blue 7	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation	22	Water: Brines containing inorganic sulfur compounds and small amounts of organic chemicals	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Baking Filtration	22	Ditto	—	—	—	—
Condensation	22	Ditto	—	—	—	—
—	—	—	—	—	—	—
See Item 724	22	See Item 724	—	—	—	—
Ditto	22	Ditto	—	—	—	—
Hydrolysis Oxidation	23	Water: brine containing sodium sulfite & small amounts of organic materials	—	—	—	—
Ditto	23	Ditto	—	30.9/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
740	CI59040 Ext. D&C Green 1	006358696	—	—	—	—
741	CI59100 Vat Yellow 4	000128665	—	—	—	—
742	CI59101 Solubilized Vat Yellow 4	003564703	—	—	—	—
743	CI59105 Vat Orange 1	001324114	—	—	—	—
744	CI59106 Solubilized Vat Orange 1	001324158	—	—	—	—
745	CI59300 Vat Orange 3	004378614	—	—	—	—
746	CI59300 Pigment Red 168	004378614	—	—	—	—
747	CI59700 Vat Orange 9	000128701	—	—	—	—
748	CI59705 Vat Orange 2	001324352	—	—	—	—
749	CI59710 Vat Orange 4	001324330	—	—	—	—
750	CI59800 Vat Blue 20	001324330	—	—	—	—
751	CI59815 Vat Blue 18	001324545	—	—	—	—
752	CI59825 Vat Green 1	000128585	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Hydrolysis	24	Water: effluent containing sodium sulfite	—	—	—	—
Benzylation Cyclization Condensation Reduction	26	Water: brines with excess alkali, manganese ion, or aluminum ion and organic substances Solid: oxide sludge	—	44.6/1973	—	—
Sulfonation	15	See Item 658	—	—	—	—
Halogenation	12	Water: hydrogen halide and small amounts of highly colored products	—	592/1973	—	—
Sulfonation	15	See Item 658	— —	—	—	—
Halogenation	12	See Item 743	—	—	—	—
Ditto	12	Ditto	—	—	—	—
Dimertization Cyclization Purification	25	Water: brine containing small amounts of organic chemicals	—	129/1973	—	—
Halogenation	12	See Item 743	—	—	—	—
Ditto	12	Ditto	—	—	—	—
Alkali Fusion Condensation Reduction	26	See Item 741	—	—	—	—
Halogenation	12	See Item 743	—	427/1973	—	—
Reduction Condensation Alkali Fusion Oxidation Methylation	26	See Item 741	—	944/1973	—	—

(Continued)

TABLE B-3. (Continued

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
753	CI59826 Solubilized Vat Green 1	002538843	—	—	—	—
754	CI59850 Vat Green 9	006369659	—	—	—	—
755	CI6000 Vat Violet 10	000128643	—	—	—	—
756	CI60005 Vat Violet 9	001324170	—	—	—	—
757	CI60010 Vat Violet 1	001324556	—	—	—	—
758	CI60010 Pigment Violet 31	001324556	—	—	—	—
759	CI60015 Vat Blue 26	004430551	—	—	—	—
760	CI60505 Solvent Red 111	000082382	—	—	—	—
761	CI60505 Disperse Red 9	000082382	—	—	—	—
762	CI60710 Disperse Red 15	000116858	—	—	—	—
763	CI60725 Disperse Blue 72	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Sulfonation	15	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals	—	—	—	—
Condensation Reduction Nitration Alkali Fusion	26	**Water:** brines with excess alkali, manganese ion, or aluminum ion and organic substances **Solid:** oxide sludge	—	—	—	—
Chlorination	27	**Water:** dilute hydrochloric acid sodium sulfide and manganous sulfate	—	—	—	—
Halogenation	12	See Item 743	—	—	—	—
Ditto	12	Ditto	—	130/1973	—	—
Ditto	12	Ditto	—	—	—	—
Oxidation Desulfurization Methylation Chlorination Sulfide Formation	27	**Water:** dilute hydrochloric acid sodium sulfide, manganous sulfate, and brines containing small quantities of organic compounds	—	—	—	—
Aminolysis	28	**Water:** brines containing small amounts of organic chemicals	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Oxidation Aminolysis	23	See Item 735	—	—	—	—
Sulfonation Oxidation Aminolysis	15,23	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals and sodium sulfite	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
764	CI60725 Solvent Violet 13	000081481	—	—	—	—
765	CI60725 D&C Violet 2	000081481	—	—	—	—
766	CI60730 Acid Violet 43	004430186	—	—	—	—
767	CI60755 Disperse Red 4	002379900	—	—	—	—
768	CI60756 Disperse Red 60	017418585	—	—	—	—
769	CI60767 Disperse Blue 27	—	—	—	—	—
770	CI61100 Disperse Violet 1	000128950	—	—	—	—
771	CI61102 Disperse Violet 28	—	—	—	—	—
772	CI61105 Disperse Violet 4	001220946	—	—	—	—
773	CI6115 Disperse Blue 9	—	—	—	—	—
774	CI61125 Acid Blue 23	033340339	—	—	—	—
775	CI61135 Acid Blue 127	—	—	—	—	—
776	CI61200 Reactive Blue 19	002580781	—	—	—	—
777	CI61200 Solvent Blue 12	—	—	—	—	—
778	CI61205 Reactive Blue 5	016823511	—	—	—	—
779	CI61205 Reactive Blue 4	013324204	—	—	—	—
780	CI61211 Reactive Blue 2	012236827	—	—	—	—
781	CI61500 Disperse Blue 14	002475447	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See above item	15,23	See above item	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
—	—	—	—	—	—	—
Methylation	29	See Item 760	—	—	—	—
Condensation	30	Water: brines containing small amounts of organic chemicals & possibly small amounts of heavy metal ions	—	930/1973	—	—
Aminolysis	28	See Item 760	—	—	—	—
Oxidation Aminolysis	28	Ditto	—	46.8/1973	—	—
—	—	—	—	—	—	—
Methylation	29	See Item 760	—	—	—	—
Oxidation Aminolysis	28	Ditto	—	—	—	—
Aminolysis	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Oxidation Aminolysis	28	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
782	CI61505 Disperse Blue 3	002475469	—	—	—	—
783	CI61525 Solvent Blue 11	000128858	—	—	—	—
784	CI61530 Acid Blue 27	—	—	—	—	—
785	CI61551 Solvent Blue 36	012226732	—	—	—	—
786	CI61552 Solvent Blue 59	—	—	—	—	—
787	CI61555 Solvent Blue 14	002646153	—	—	—	—
788	CI61565 Solvent Green 3	000128803	—	—	—	—
789	CI61565 D&C Green 6	000128803	—	—	—	—
790	CI61570 D&C Green 5	004403901	—	—	—	—
791	CI61570 Acid Green 25	004403901	—	—	—	—
792	CI61585 Acid Blue 80	004474242	—	—	—	—
793	CI61705 Solvent Violet 14	—	—	—	—	—
794	CI61710 Acid Violet 34	006408635	—	—	—	—
795	CI61725 Vat Yellow 3	—	—	—	—	—
796	CI61800 Acid Violet 34	—	—	—	—	—
797	CI62015 Disperse Red 11	002872482	—	—	—	—
798	CI62020 Acid Violet 41	—	—	—	—	—
799	CI62025 Disperse Violet 26	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Oxidation Aminolysis	28	See above item	—	619/1973	—	—
Aminolysis	28	Ditto	—	—	—	—
Sulfonation	15	See Item 753	—	67.7/1973	—	—
Aminolysis Oxidation	28	See Item 743	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Sulfonation Oxidation Aminolysis	15,28	See Item 753	—	98.6/1973	—	—
Ditto	Ditto	Ditto	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	153/1973	—	—
Sulfonation Aminolysis	15,28	See Item 753	—	—	—	—
Aminolysis	28	See Item 743	—	—	—	—
Ditto	31	Ditto	—	—	—	—
Amide Formation	31	Ditto	—	—	—	—
Sulfonation Aminolysis	15,28	See Item 753	—	—	—	—
Aminolysis	28	See Item 743	—	—	—	—
Condensation	30	Water: brines containing small amounts of organic chemicals and possibly small amounts of heavy metal ions	—	—	—	—
Ditto	30	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
800	CI62030 Disperse Violet 8	000082337	—	—	—	—
801	CI62045 Acid Blue 62	004368563	—	—	—	—
802	CI62055 Acid Blue 25	006408782	—	—	—	—
803	CI62070 Acid Blue 145	006408806	—	—	—	—
804	CI62073 Acid Blue 230	—	—	—	—	—
805	CI62080 Solvent Blue 13	—	—	—	—	—
806	CI62085 Acid Blue 47	004403898	—	—	—	—
807	CI62105 Acid Blue 78	006424755	—	—	—	—
808	CI62125 Acid Blue 40	006424357	—	—	—	—
809	CI62130 Acid Blue 41	002666173	—	—	—	—
810	CI62500 Disperse Blue 7	003179906	—	—	—	—
811	CI62560 Acid Green 41	—	—	—	—	—
812	CI6300 Acid Blue 43	002150609	—	—	—	—
813	CI63005 Solvent Blue 74	—	—	—	—	—
814	CI63010 Acid Blue 45	002861021	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Nitration	32	**Air:** nitrogen oxide emissions **Water:** spent acid from nitration (e.g., sulfuric acid)	—	—	—	—
Aminolysis	28	**Water:** brines containing small amounts of organic chemicals	—	21.8/1973	—	—
Ditto	28	Ditto	—	292/1973	—	—
Condensation	30	**Water:** brines containing small amounts of organic chemicals and possibly small amounts of heavy metal ions	—	—	—	—
Aminolysis	28	See Item 801	—	—	—	—
Sulfonation Aminolysis	15,28	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals	—	—	—	—
—	—	—	—	—	—	—
Sulfonation	15	See Item 805	—	14.6/1973	—	—
Aminolysis	28	See Item 801	—	309/1973	—	—
—	—	—	—	15.5/1973	—	—
Aminolysis	28	See Item 801	—	—	—	—
Ditto	28	Ditto	—	—	—	—
Sulfonation	15	See Item 805	—	—	—	—
—	—	—	—	—	—	—
Nitrosation Reduction Sulfonation	33	**Air:** sulfur oxides, nitrogen oxides & hydrogen sulfides **Water:** spent acids	—	41/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
815	CI63285 Disperse Blue 56	012217797	—	—	—	—
816	CI63365 Vat Violet 17	003076877	—	—	—	—
817	CI63615 Mordant Black 13	—	—	—	—	—
818	CI64500 Disperse Blue 1	002475458	—	—	—	—
819	CI64515 Acid Blue 81	—	—	—	—	—
820	CI65005 Acid Black 48	001328241	—	—	—	—
821	CI65049 Pigment Yellow 123	—	—	—	—	—
822	CI65230 Vat Black 9	—	—	—	—	—
823	CI65430 Solubilized Vat Yellow 10	—	—	—	—	—
824	CI6700 Vat Red 10	002379795	—	—	—	—
825	CI67300 Vat Yellow 2	000129099	—	—	—	—
826	CI67895 Vat Violet 14	—	—	—	—	—
827	CI68210 Solvent Red 52	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
Amide Formation	31	See Item 801	—	—	—	—
Sulfonation Aminolysis	15,28	See Item 805	—	—	—	—
Amide Formation	32	See Item 800	—	104/1973	—	—
Sulfonation Aminolysis	15,28	See Item 805	—	—	—	—
Ditto	Ditto	Ditto	—	—	—	—
Amide Formation	31	**Water:** brines containing small amounts of organic materials	—	—	—	—
Condensation	34	**Solid:** copper salts, sodium bromide & distillation residues	—	—	—	—
Amide Formation Reduction Hydrolysis	31	See Item 801	—	—	—	—
Condensation Cyclization Reduction	36	**Water:** brines, spent sulfuric acid and a sodium thiosulfate solution containing small amounts of organic chemicals **Solid:** distillation residues	—	—	—	—
Condensation Purification	36	Ditto	—	1696/1973	—	—
Aminolysis Halogenation	28,12	**Water:** hydrogen halide and small amounts of highly colored products & brine with small amounts of organic chemicals	—	—	—	—
Aminolysis	28	See Item 801	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
828	CI68215 Acid Red 80	004478766	—	—	—	—
829	CI68420 Pigment Yellow 108	—	—	—	—	—
830	CI68700 Vat Violet 13	—	—	—	—	—
831	CI69005 Vat Black 27	002379819	—	—	—	—
832	CI69015 Vat Brown 3	000131920	—	—	—	—
833	CI69015 Pigment Brown 28	000131920	—	—	—	—
834	CI69025 Vat Orange 15	002379784	—	—	—	—
835	CI69500 Vat Green 3	003271769	—	—	—	—
836	CI69501 Solubilized Vat Green 3	004471378	—	—	—	—
837	CI69525 Vat Black 25	004395533	—	—	—	—
838	CI69705 Vat Yellow 21	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Halogenation Sulfonation	12,15	Water: hydrogen halide, dilute sulfuric acid, small amounts of highly colored products and brine solutions contaminated with small amounts of organic chemicals	—	—	—	—
Amide Formation	31	See Item 521	—	—	—	—
Aminolysis	28	See Item 501	—	276/1973	—	—
Ditto	28	Ditto	—	171/1973	—	—
Aminolysis Oxidation Cyclization Purification Condensation Filtration	28,37	Water: sulfuric acid solutions containing small amounts of organic chemicals, and aqueous solutions containing salt, copper ion, chromium ion, and sulfate ion	—	262/1973	—	—
Ditto	28,37	—	—	—	—	—
Oxidation Cyclization Purification Condensation Filtration	37	Ditto	—	336/1973	—	—
Aminolysis Cyclization Condensation	28,34	Water: brines containing small amounts of organic chemicals Solid: copper salts, sodium bromide, and distillation residues	—	604/1973	—	—
Sulfonation	15	See Item 805	—	—	—	—
Aminolysis Cyclization Condensation	28,34	See Item 835	—	1066/1973	—	—
Oxidation Baking	22	See Item 724	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
839	CI69800 Vat Blue 4	000081776 (T K6 I6 F6 D6 C666 BV EM JV QV TM B&VJ)	200 rat	—	—	—
840	CI69805 Acid Dye 0	—	—	—	—	—
841	CI69810 Vat Blue 14	028675914	—	—	—	—
842	CI69810 Pigment Blue 22	028675914	—	—	—	—
843	CI69815 Vat Blue 11	000130198	—	—	—	—
844	CI69825 Vat Blue 6	000130201	—	—	—	—
845	CI69825 Pigment Blue 64	000130201	—	—	—	—
846	CI69826 Solubilized Vat Blue 6	002519280	—	—	—	—
847	CI69840 Vat Blue 12	028675925	—	—	—	—
848	CI70315 Vat Dye 0	—	—	—	—	—
849	CI70320 Vat Red 13	004203774	—	—	—	—
850	CI70507 Vat Blue 67	—	—	—	—	—
851	CI70600 Vat Yellow 1	000475718	—	—	—	—
852	CI70600 Pigment Yellow 24	000475718	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Amide Formation Purification Filtration	38	**Water:** alkaline solutions as well as sodium sulfate	—	—	—	2)330,117
Sulfonation	15	See Item 805	—	—	—	—
Halogenation	12	**Water:** hydrogen halide and small amounts of highly colored products	—	—	—	—
Ditto	12	Ditto	—	—	—	—
—	—	—	—	—	—	—
Halogenation	12	See Item 841	—	890/1973	—	—
Ditto	12	Ditto	—	—	—	—
Sulfonation	15	See Item 805	—	—	—	—
Ditto	15	Ditto	—	—	—	—
Diazotization Reduction Cyclization Dimerization Ethylation	35	**Air:** nitrogen oxides and possibly sulfur dioxide **Water:** spent acid & brine containing small amounts of organic materials	—	—	—	—
Ditto	35	Ditto	—	127/1973	—	—
—	—	—	—	—	—	—
Condensation Viltration	38	**Water:** alkaline solutions as well as sodium sulfate	—	—	—	—
Ditto	38	Ditto	—	360/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
853	CI70800 Vat Brown 1	002475334	—	—	—	—
854	CI70801 Solubilized Vat Brown 1	023725157	—	—	—	—
855	CI70805 Vat Orange 11	002172330	—	—	—	—
856	CI71050 Vat Green 8	001499974	—	—	—	—
857	CI71100 Vat Red 15	004216028	—	—	—	—
858	CI71105 Pigment Orange 43	004424060	—	—	—	—
859	CI71105 Vat Orange 7	004424060	—	—	—	—
860	CI71110 Vat Red 14	—	—	—	—	—
861	CI71129 Pigment Brown 26	—	—	—	—	—
862	CI71130 Vat Red 23	005521313	—	—	—	—
863	CI71130 Pigment Red 179	005521313	—	—	—	—
864	CI71135 Vat Red 32	002379773	—	—	—	—
865	CI71137 Pigment Red 149	012225024	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Cyclization	39	Water: brines containing copper & aluminum ions, and small amounts of organic compounds Solid: distillation residues	—	—	—	—
Sulfonation	15	Water: See Item 805	—	—	—	—
Condensation Cyclization	39	See Item 853	—	—	—	—
Ditto	39	Ditto	—	102/1973	—	—
Amide Formation Filtration	40	Water: effluents containing organic chemicals, acetic acid, o-phenylenediamine, ethanol, and potassium hydroxide Solid: distillation residues	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
See Item 857	40	See Item 857	—	—	—	—
Amide Formation	41	Water: effluents containing alkali, sodium sulfate, and organic compounds	—	—	—	—
Amide Formation Methylation	41	Ditto	—	—	—	—
Ditto	41	Ditto	—	—	—	—
Condensation Hydrolysis Amide Formation	41	See Item 861	—	—	—	—
Ditto	41	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
866	CI71140 Pigment Red 190	006424777	—	—	—	—
867	CI71140 Vat Red 29	006424777	—	—	—	—
868	CI71145 Pigment Red 123	—	—	—	—	—
869	CI71200 Var Blue 16	006424766	—	—	—	—
870	CI71205 Vat Blue 53	—	—	—	—	—
871	CI73000 Vat Blue 1	000482893	—	—	—	—
872	CI73000 D&C Blue 6	000482893	—	—	—	—
873	CI73015 FD&C Blue 2	000860220 (T56 BMYVJ G SWQ C-21 & -NA-2)	—	—	—	TDLo:10 gm/kg/ 2YI, TFX:CAR scu-rat
874	CI73015 Acid Blue 74	000860220	—	—	—	Ditto
875	CI73065 Vat Blue 5	—	—	—	—	—
876	CI73300 Vat Red 41	000522758	—	—	—	—
877	CI73310 Pigment Red 87	006371115	—	—	—	—
878	CI73312 Pigment Red 88	014295433	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
See above item	41	See above item	—	—	—	—
Ditto	41	Ditto	—	—	—	—
Ditto	41	Ditto	—	—	—	—
Reduction Condensation Oxidation	26	**Water:** brines with excess alkali, manganese ion, or aluminum ion and organic substances **Solid:** oxide sludge	—	—	—	—
Halogenation	12	See Item 841	—	—	—	—
Amide Formation Filtration Alkylation Hydrolysis	42	**Water:** small amounts of salts and organic compounds	—	—	—	—
Ditto	42	Ditto	—	—	—	—
Sulfonation	15	**Water:** dilute sulfuric acid and brine solutions contaminated with small amounts of organic chemicals	—	37.7/1973	—	2)330,217
Ditto	15	Ditto	—	—	—	Ditto
Halogenation	12	See Item 841	—	—	—	—
Diazotization Alkylation Amide Formation Oxidation Substitution	43	**Water:** dilute alkali solutions and also sodium chloride & small amounts of organic chemicals & nitrogen oxides **Solid:** copper sulfide	—	—	—	—
Hydrolysis Alkylation Cyclization Herz Reaction	45	**Water:** brine contaminated with varying amounts of organic chemicals & cyanide ion	—	—	—	—
Ditto	45	Ditto	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
879	CI73335 Vat Orange 5	003263318	—	—	—	—
880	CI73336 Solubilized Vat Orange 5	010126871	—	—	—	—
881	CI73360 Vat Red 1	002379740	—	—	—	—
882	CI73360 Pigment Red 181	—	—	—	—	—
883	CI73360 D&C Red 30	002379740	—	—	—	—
884	CI73361 Solubilized Vat Red 1	003875727	—	—	—	—
885	CI73385 Vat Violet 2	005462293	—	—	—	—
886	CI73385 Pigment Violet 36	005462293	—	—	—	—
887	CI73390 Pigment Red 198	—	—	—	—	—
888	CI73395 Pigment Violet 38	002379751	—	—	—	—
889	CI73395 Vat Violet 3	00237951	—	—	—	—
890	CI73410 Vat Brown 5	003989751	—	—	—	—
891	CI73670 Vat Black 1	003687670	—	—	—	—
892	CI73915 Pigment Red 122	012225002	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Hydrolysis Alkylation Cyclization Herz Reaction	45	See Item 877	—	—	—	—
Sulfonation	15	See Item 873	—	—	—	—
See Item 877	45	See Item 877	—	141/1973	—	—
Ditto	45	Ditto	—	—	—	—
Ditto	45	Ditto	—	—	—	—
Sulfonation	15	See Item 873	—	—	—	—
See Item 877	45	See Item 877	—	—	—	—
Ditto	45	Ditto	—	—	—	—
Ditto	45	Ditto	—	—	—	—
Acid Chloride Formation Reduction Alkylation Cyclization Oxidation	44	**Water:** dilute hydrochloric acid, phosphorus oxychloride, aqueous zinc chloride solution & aluminum chlorohydrate solution **Solid:** distillation residues	—	—	—	—
Ditto	44	Ditto	—	—	—	—
Ditto	44	Ditto	—	—	—	—
Oxidation Chlorination Bromination Condensation	46	**Water:** brines containing small amounts of organic chemicals	—	—	—	—
See Item 884	15	See Item 884	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
893	CI73915 Pigment Red 122	012225002	—	—	—	—
894	CI74140 Vat Blue 29	—	—	—	—	—
895	CI74160 Beta Pigment Blue 15	000147148	—	—	—	—
896 BI	CI74160 Alpha Pigment Blue 15	000147148	—	—	—	—
897	CI74160 Ingrain Blue 2	000147148*	—	—	—	—
898	CI74160 Pigment Green 16	001330387*	—	—	—	—
899	CI74180 Lake Pigment Blue 17	001330387*	—	—	—	—
900	CI74180 Direct Blue 86	001330387	—	—	—	—
901	CI74200 Direct Blue 87	—	—	—	—	—
902	CI74240 Ingrain Blue 1	—	—	—	—	—
903	CI74260 Pigment Green 7	—	—	—	—	—
904	CI74460 Reactive Blue 7	012238094	—	—	—	—
905	CI75290 Natural Black 1	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	44.1/1973	—	—
—	—	—	—	—	—	—
Chlorination Condensation Grinding Acid Pasting	47	Water: relatively large amounts of waste sulfuric acid and bright blue pigment. Also, brines containing aluminum ion & small amounts of organic chemicals	—	2880/1973	—	—
Ditto	47	Ditto	—	2033/1973	—	—
Ditto	47	Ditto	—	—	—	—
Ditto	47	Ditto	—	—	—	—
Sulfonation	15	Water: dilute sulfuric acid & brine solutions contaminated with small amounts of organic chemicals	—	—	—	—
Ditto	15	Ditto	—	493/1973	—	—
Ditto	15	Ditto	—	—	—	—
Condensation Chloromethylation	47	See Item 895	—	—	—	—
Chlorination Condensation Grinding Acid Pasting	47	Ditto	—	—	—	—
Condensation Amide Formation Reduction Chlorosulfonation	47	Ditto	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
906	CI75291 Lake Natural Black 3	—	—	—	—	—
907	CI75330 Natural Red 6	—	—	—	—	—
908	CI75780 Natural Blue 1	—	—	—	—	—
909	CI76070 Oxidation Base 22	—	—	—	—	—
910	CI76075 Oxidation Base 8	—	—	—	—	—
911	CI76540 Oxidation Base 21	—	—	—	—	—
912	CI76555 Oxidation Base 25	—	—	—	—	—
913	CI77510 Pigment Blue 27	—	—	—	—	—
914	— Pigment Blue 23	—	—	—	—	—
915	— Pigment Red 91	—	—	—	—	—
916	— Pigment Red 170	—	—	—	—	—
917	— Pigment Red 177	004051632	—	—	—	—
918	— Pigment Violet 74	—	—	—	—	—
919	— PMA Pigment Red 79	—	—	—	—	—
920	— Pigment Orange 38	—	—	—	—	—
921	— Pigment Yellow 85	—	—	—	—	—
922	— Vat Blue 39	—	—	—	—	—
923	— Vat Blue 60	—	—	—	—	—
924	— Vat Brown 11	—	—	—	—	—
925	— Vat Green 32	—	—	—	—	—
926	— Vat Green 20	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
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TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
927	— Vat Brown 57	—	—	—	—	—
928	— Vat Brown 40	—	—	—	—	—
929	— Vat Brown 31	—	—	—	—	—
930	— Vat Brown 29	—	—	—	—	—
931	— Vat Brown 28	—	—	—	—	—
932	— Vat Brown 20	—	—	—	—	—
933	— Vat Brown 13	—	—	—	—	—
934	— Vat Brown 12	—	—	—	—	—
935	— Vat Black 13	—	—	—	—	—
936	— Vat Black 22	—	—	—	—	—
937	— Vat Black 34	—	—	—	—	—
938	— Vat Black 52	—	—	—	—	—
939	— Vat Black 38	—	—	—	—	—
940	— Vat Black 37	—	—	—	—	—
941	— Pigment Yellow 76	—	—	—	—	—
942	— Vat Violet 21	—	—	—	—	—
943	— Vat Red 12	—	—	—	—	—
944	— Vat Red 52	—	—	—	—	—
945	— Vat Red 16	—	—	—	—	—
946	— Vat Yellow 15	—	—	—	—	—
947	— Vat Yellow 33	—	—	—	—	—
948	— Vat Yellow 22	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
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TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
949	—— Vat Yellow 14	—	—	—	—	—
950	—— Leuco Sulfur Brown 82	—	—	—	—	—
951	—— Leuco Sulfur Brown 81	—	—	—	—	—
952	—— Solvent Yellow 13	—	—	—	—	—
953	—— Solvent Yellow 40	—	—	—	—	—
954	—— Solvent Yellow 45	—	—	—	—	—
955	—— Solvent Yellow 44	002478208	—	—	—	—
956	—— Solvent Yellow 43	012226969	—	—	—	—
957	—— Solvent Yellow 42	—	—	—	—	—
958	—— Mordant Black 26	—	—	—	—	—
959	—— Mordant Black 8	—	—	—	—	—
960	—— Mordant Brown 70	—	—	—	—	—
961	—— Mordant Brown 63	—	—	—	—	—
962	—— Mordant Orange 8	—	—	—	—	—
963	—— Mordant Red 64	—	—	—	—	—
964	—— Mordant Yellow 29	—	—	—	—	—
965	—— Mordant Blue 19	—	—	—	—	—
966	—— Ingrain Blue 3	—	—	—	—	—
967	—— Fluorescent Brightener 159	—	—	—	—	—
968	—— Fluorescent Brightener 158	—	—	—	—	—
969	—— FD&C Red 40	025956176	—	—	—	—
970	—— Solvent Red 68	—	—	—	—	—
971	—— Solvent Red 33	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
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TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
972	— Solvent Red 40	—	—	—	—	—
973	— Solvent Orange 51	—	—	—	—	—
974	— Solvent Orange 48	—	—	—	—	—
975	— Solvent Orange 20	—	—	—	—	—
976	— Solvent Orange 31	—	—	—	—	—
977	— Solvent Orange 25	—	—	—	—	—
978	— Solvent Orange 24	—	—	—	—	—
979	— Solvent Orange 23	—	—	—	—	—
980	— Solvent Yellow 107	—	—	—	—	—
981	— Solvent Yellow 87	—	—	—	—	—
982	— Solvent Yellow 47	—	—	—	—	—
983	— Solvent Yellow 72	—	—	—	—	—
984	— Solvent Yellow 71	—	—	—	—	—
985	— Solvent Blue 9	—	—	—	—	—
986	— Solvent Blue 16	—	—	—	—	—
987	— Solvent Blue 57	—	—	—	—	—
988	— Solvent Blue 43	—	—	—	—	—
989	— Solvent Blue 38	—	—	—	—	—
990	— Solvent Blue 37	—	—	—	—	—
991	— Solvent Violet 17	—	—	—	—	—
992	— Solvent Red 166	—	—	—	—	—
993	— Solvent Red 164	—	—	—	—	—
994	— Solvent Red 108	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
995	— Solvent Red 126	—	—	—	—	—
996	— Solvent Red 115	—	—	—	—	—
997	— Solvent Red 105	—	—	—	—	—
998	— Solvent Red 75	—	—	—	—	—
999	— Solvent Red 74	—	—	—	—	—
1000	— Solvent Red 69	—	—	—	—	—
1001	— Solvent Blue 60	—	—	—	—	—
1002	— Solvent Blue 58	—	—	—	—	—
1003	— Solvent Blue 100	—	—	—	—	—
1004	— Solvent Blue 98	—	—	—	—	—
1005	— Solvent Blue 89	—	—	—	—	—
1006	— Solvent Green 2	—	—	—	—	—
1007	— Solvent Brown 11	—	—	—	—	—
1008	— Solvent Brown 38	—	—	—	—	—
1009	— Solvent Brown 22	—	—	—	—	—
1010	— Solvent Brown 20	—	—	—	—	—
1011	— Solvent Brown 19	—	—	—	—	—
1012	— Leuco Sulfur Yellow 15	—	—	—	—	—
1013	— Solvent Black 26	—	—	—	—	—
1014	— Solvent Black 17	—	—	—	—	—
1015	— Solvent Black 13	—	—	—	—	—
1016	— Solvent Black 12	—	—	—	—	—
1017	— Leuco Sulfur Brown 3	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1018	— Solubilized Sulfur Brown 37	—	—	—	—	—
1019	— Leuco Sulfur Brown 37	—	—	—	—	—
1020	— Leuco Sulfur Blue 5	—	—	—	—	—
1021	— Sulfur Blue 8	—	—	—	—	—
1022	— Leuco Sulfur Green 16	—	—	—	—	—
1023	— Sulfur Green 14	—	—	—	—	—
1024	— Pigment Green 38	—	—	—	—	—
1025	— Pigment Green 48	—	—	—	—	—
1026	— Pigment Brown 32	—	—	—	—	—
1027	— Acid Yellow 49	—	—	—	—	—
1028	— Acid Yellow 59	001220529	—	—	—	—
1029	— Acid Yellow 19	—	—	—	—	—
1030	— Acid Yellow 79	—	—	—	—	—
1031	— Acid Yellow 124	—	—	—	—	—
1032	— Acid Yellow 114	—	—	—	—	—
1033	— Acid Yellow 152	—	—	—	—	—
1034	— Acid Yellow 174	—	—	—	—	—
1035	— Acid Yellow 159	—	—	—	—	—
1036	— Acid Yellow 135	—	—	—	—	—
1037	— Acid Yellow 129	—	—	—	—	—
1038	— Acid Yellow 128	—	—	—	—	—
1039	— Acid Yellow 127	—	—	—	—	—
1040	— Acid Orange 2	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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—	—	—	—	199/1973	—	—
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—	—	—	—	230/1973	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
1041	— Acid Yellow 198	—	—	—	—	—
1042	— Acid Yellow 190	—	—	—	—	—
1043	— Acid Yellow 179	—	—	—	—	—
1044	— Acid Yellow 175	—	—	—	—	—
1045	— Acid Blue 69	006370623	—	—	—	—
1046	— Acid Blue 63	—	—	—	—	—
1047	— Acid Blue 122	—	—	—	—	—
1048	— Acid Blue 165	—	—	—	—	—
1049	— Acid Blue 198	—	—	—	—	—
1050	— Acid Blue 179	—	—	—	—	—
1051	— Acid Violet 29	—	—	—	—	—
1052	— Acid Violet 76	—	—	—	—	—
1053	— Acid Red 337	—	—	—	—	—
1054	— Acid Red 309	—	—	—	—	—
1055	— Acid Red 299	—	—	—	—	—
1056	— Acid Red 278	—	—	—	—	—
1057	— Acid Red 277	012220267	—	—	—	—
1058	— Acid Red 266	—	—	—	—	—
1059	— Acid Red 225	—	—	—	—	—
1060	— Acid Red 213	—	—	—	—	—
1061	— Acid Red 212	—	—	—	—	—
1062	— Acid Red 211	012239053	—	—	—	—
1063	— Acid Red 119	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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—	—	—	—	127/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	60.0/1973	—	—
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—	—	—	—	134/1973	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1064	— Acid Red 100	—	—	—	—	—
1065	— Acid Red 167	—	—	—	—	—
1066	— Acid Red 175	—	—	—	—	—
1067	— Acid Red 178	—	—	—	—	—
1068	— Acid Red 182	—	—	—	—	—
1069	— Acid Red 191	—	—	—	—	—
1070	— Acid Red 194	—	—	—	—	—
1071	— Acid Red 57	—	—	—	—	—
1072	— Acid Orange 136	—	—	—	—	—
1073	— Acid Orange 132	—	—	—	—	—
1074	— Acid Orange 64	—	—	—	—	—
1075	— Acid Orange 62	—	—	—	—	—
1076	— Acid Orange 69	—	—	—	—	—
1077	— Acid Orange 128	—	—	—	—	—
1078	— Acid Orange 119	—	—	—	—	—
1079	— Acid Orange 116	—	—	—	—	—
1080	— Acid Orange 86	012220074	—	—	—	—
1081	— Acid Black 29	—	—	—	—	—
1082	— Acid Brown 354	—	—	—	—	—
1083	— Acid Brown 243	—	—	—	—	—
1084	— Acid Brown 239	—	—	—	—	—
1085	— Acid Brown 158	—	—	—	—	—
1086	— Acid Brown 152	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1087	— Acid Brown 98	—	—	—	—	—
1088	— Acid Brown 97	—	—	—	—	—
1089	— Acid Brown 96	—	—	—	—	—
1090	— Acid Black 172	—	—	—	—	—
1091	— Acid Black 140	012219040	—	—	—	—
1092	— Acid Black 58	012218949	—	—	—	—
1093	— Acid Black 53	—	—	—	—	—
1094	— Acid Black 139	—	—	—	—	—
1095	— Acid Black 108	—	—	—	—	—
1096	— Acid Black 107	012218961	—	—	—	—
1097	— Acid Black 92	—	—	—	—	—
1098	— Acid Green 58	—	—	—	—	—
1099	— Acid Green 84	—	—	—	—	—
1100	— Acid Green 70	—	—	—	—	—
1101	— Acid Brown 19	012234730	—	—	—	—
1102	— Acid Brown 28	—	—	—	—	—
1103	— Acid Brown 22	—	—	—	—	—
1104	— Acid Brown 58	—	—	—	—	—
1105	— Acid Brown 51	—	—	—	—	—
1106	— Acid Brown 45	012219544	—	—	—	—
1107	— Acid Brown 31	—	—	—	—	—
1108	— Acid Blue 221	—	—	—	—	—
1109	— Acid Blue 215	014541903	—	—	—	—
1110	— Acid Blue 203	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1111	— Acid Blue 298	—	—	—	—	—
1112	— Acid Blue 231	—	—	—	—	—
1113	— Azoic Brown 9	—	—	—	—	—
1114	— Azoic Red 74	—	—	—	—	—
1115	— Azoic Blue 2	—	—	—	—	—
1116	— Azoic Blue 3	—	—	—	—	—
1117	— Azoic Red 73	—	—	—	—	—
1118	— Azoic Black 1	—	—	—	—	—
1119	— Azoic Brown 26	—	—	—	—	—
1120	— Azoic Black 15	—	—	—	—	—
1121	— Azoic Black 4	—	—	—	—	—
1122	— Basic Blue 35	—	—	—	—	—
1123	— Basic Blue 22	—	—	—	—	—
1124	— Basic Blue 21	—	—	—	—	—
1125	— Basic Blue 45	—	—	—	—	—
1126	— Basic Blue 45	—	—	—	—	—
1127	— Basic Blue 47	012217435	—	—	—	—
1128	— Basic Blue 76	—	—	—	—	—
1129	— Basic Blue 75	—	—	—	—	—
1130	— Basic Blue 69	—	—	—	—	—
1131	— Basic Blue 60	—	—	—	—	—
1132	— Basic Violet 24	—	—	—	—	—
1133	— Basic Violet 15	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	160/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	144/1973	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1134	— Basic Orange 41	—	—	—	—	—
1135	— Basic Orange 40	—	—	—	—	—
1136	— Basic Red 14	—	—	—	—	—
1137	— Basic Orange 24	—	—	—	—	—
1138	— Basic Orange 26	—	—	—	—	—
1139	— Basic Orange 25	—	—	—	—	—
1140	— Basic Orange 39	—	—	—	—	—
1141	— Basic Orange 31	—	—	—	—	—
1142	— Basic Orange 28	—	—	—	—	—
1143	— Basic Orange 27	—	—	—	—	—
1144	— Basic Red 73	—	—	—	—	—
1145	— Basic Red 46	—	—	—	—	—
1146	— Basic Red 51	—	—	—	—	—
1147	— Basic Red 49	—	—	—	—	—
1148	— Basic Red 23	—	—	—	—	—
1149	— Basic Red 22	—	—	—	—	—
1150	— Basic Red 19	—	—	—	—	—
1151	— Basic Red 17	—	—	—	—	—
1152	— Basic Red 16	—	—	—	—	—
1153	— Basic Red 15	—	—	—	—	—
1154	— Azoic Coupling 3	—	—	—	—	—
1155	— Basic Yellow 15	—	—	—	—	—
1156	— Basic Yellow 13	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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—	—	—	—	—	—	—
—	—	—	—	175/1973	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1157	— Basic Yellow 21	—	—	—	—	—
1158	— Basic Yellow 31	—	—	—	—	—
1159	— Basic Yellow 29	—	—	—	—	—
1160	— Basic Yellow 28	—	—	—	—	—
1161	— Basic Yellow 58	—	—	—	—	—
1162	— Basic Yellow 53	—	—	—	—	—
1163	— Basic Yellow 52	—	—	—	—	—
1164	— Basic Yellow 41	—	—	—	—	—
1165	— Salt Azoic Diazoic 121	—	—	—	—	—
1166	— Reactive Blue 21	—	—	—	—	—
1167	— Reactive Blue 38	012236907	—	—	—	—
1168	— Reactive Blue 30	—	—	—	—	—
1169	— Reactive Blue 29	—	—	—	—	—
1170	— Reactive Blue 25	—	—	—	—	—
1171	— Reactive Brown 17	—	—	—	—	—
1172	— Reactive Brown 10	—	—	—	—	—
1173	— Reactive Brown 9	—	—	—	—	—
1174	— Reactive Green 6	—	—	—	—	—
1175	— Reactive Blue 91	—	—	—	—	—
1176	— Reactive Blue 90	—	—	—	—	—
1177	— Reactive Blue 89	—	—	—	—	—
1178	— Reactive Blue 71	—	—	—	—	—
1179	— Reactive Blue 3	012239371	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1180	— Reactive Violet 1	—	—	—	—	—
1181	— Reactive Red 105	—	—	—	—	—
1182	— Reactive Red 94	—	—	—	—	—
1183	— Reactive Red 86	—	—	—	—	—
1184	— Reactive Red 58	02310978	—	—	—	—
1185	— Reactive Red 55	027873627	—	—	—	—
1186	— Reactive Red 43	—	—	—	—	—
1187	— Reactive Red 41	012226185	—	—	—	—
1188	— Reactive Red 40	012226174	—	—	—	—
1189	— Reactive Red 33	—	—	—	—	—
1190	— Reactive Red 31	—	—	—	—	—
1191	— Fluorescent Brightener 49	—	—	—	—	—
1192	— Fluorescent Brightener 45	—	—	—	—	—
1193	— Fluorescent Brightener 33	—	—	—	—	—
1194	— Fluorescent Brightener 25	—	—	—	—	—
1195	— Fluorescent Brightener 24	—	—	—	—	—
1196	— Reactive Black 9	—	—	—	—	—
1197	— Fluorescent Brightener 22	—	—	—	—	—
1198	— Fluorescent Brightener 8	—	—	—	—	—
1199	— Fluorescent Brightener 6	—	—	—	—	—
1200	— Fluorescent Brightener 134	—	—	—	—	—
1201	— Fluorescent Brightener 130	—	—	—	—	—
1202	— Fluorescent Brightener 128	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1203	— Fluorescent Brightener 126	—	—	—	—	—
1204	— Fluorescent Brightener 125	—	—	—	—	—
1205	— Fluorescent Brightener 114	012270518	—	—	—	—
1206	— Fluorescent Brightener 109	—	—	—	—	—
1207	— Fluorescent Brightener 108	—	—	—	—	—
1208	— Fluorescent Brightener 102	—	—	—	—	—
1209	— Fluorescent Brightener 75	012226969	—	—	—	—
1210	— Fluorescent Brightener 71	—	—	—	—	—
1211	— Fluorescent Brightener 68	—	—	—	—	—
1212	— Fluorescent Brightener 61	—	—	—	—	—
1213	— Fluorescent Brightener 59	—	—	—	—	—
1214	— Fluorescent Brightener 52	—	—	—	—	—
1215	— Disperse Black 9	001222694	—	—	—	—
1216	— Disperse Black 34	—	—	—	—	—
1217	— Disperse Black 33	—	—	—	—	—
1218	— Reactive Yellow 4	012226458	—	—	—	—
1219	— Reactive Yellow 3	006539679	—	—	—	—
1220	— Reactive Yellow 2	016893484	—	—	—	—
1221	— Reactive Yellow 1	005089167	—	—	—	—
1222	— Disperse Brown 14	—	—	—	—	—
1223	— Disperse Brown 11	—	—	—	—	—
1224	— Disperse Brown 8	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1225	—— Disperse Brown 7	——	——	——	——	——
1226	—— Disperse Brown 5	——	——	——	——	——
1227	—— Disperse Brown 2	——	——	——	——	——
1228	—— Disperse Blue 173	——	——	——	——	——
1229	—— Disperse Blue 172	——	——	——	——	——
1230	—— Disperse Blue 166	——	——	——	——	——
1231	—— Disperse Blue 165	——	——	——	——	——
1232	—— Disperse Blue 156	——	——	——	——	——
1233	—— Disperse Blue 152	——	——	——	——	——
1234	—— Disperse Blue 150	——	——	——	——	——
1235	—— Disperse Blue 148	——	——	——	——	——
1236	—— Disperse Blue 139	——	——	——	——	——
1237	—— Disperse Blue 138	——	——	——	——	——
1238	—— Disperse Blue 133	——	——	——	——	——
1239	—— Disperse Blue 132	——	——	——	——	——
1240	—— Disperse Blue 125	——	——	——	——	——
1241	—— Disperse Blue 123	——	——	——	——	——
1242	—— Reactive Yellow 15	——	——	——	——	——
1243	—— Reactive Yellow 7	——	——	——	——	——
1244	—— Reactive Yellow 6	012239484	——	——	——	——
1245	—— Reactive Yellow 25	012226527	——	——	——	——
1246	—— Reactive Yellow 24	012226516	——	——	——	——
1247	—— Reactive Yellow 18	——	——	——	——	——

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1248	— Reactive Yellow 17	020317195	—	—	—	—
1249	— Reactive Orange 5	—	—	—	—	—
1250	— Reactive Orange 4	—	—	—	—	—
1251	— Reactive Orange 1	006522743	—	—	—	—
1252	— Reactive Yellow 86	—	—	—	—	—
1253	— Reactive Yellow 62	—	—	—	—	—
1254	— Reactive Yellow 42	—	—	—	—	—
1255	— Reactive Yellow 37	—	—	—	—	—
1256	— Reactive Yellow 31	—	—	—	—	—
1257	— Reactive Red 2	012226038	—	—	—	—
1258	— Reactive Red 5	—	—	—	—	—
1259	— Reactive Red 11	—	—	—	—	—
1260	— Reactive Red 29	—	—	—	—	—
1261	— Reactive Red 21	—	—	—	—	—
1262	— Reactive Orange 50	—	—	—	—	—
1263	— Reactive Orange 49	—	—	—	—	—
1264	— Reactive Orange 14	012225864	—	—	—	—
1265	— Reactive Orange 13	—	—	—	—	—
1266	— Reactive Orange 12	—	—	—	—	—
1267	— Reactive Orange 11	—	—	—	—	—
1268	— Disperse Violet 57	—	—	—	—	—
1269	— Disperse Violet 44	—	—	—	—	—
1270	— Disperse Violet 43	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	--	—	--	--	--	--
--	—	--	—	--	--	--
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1271	— Disperse Violet 42	—	—	—	—	—
1272	— Disperse Violet 41	—	—	—	—	—
1273	— Disperse Violet 40	—	—	—	—	—
1274	— Disperse Red 211	—	—	—	—	—
1275	— Disperse Violet 17	—	—	—	—	—
1276	— Disperse Violet 27	—	—	—	—	—
1277	— Disperse Red 180	—	—	—	—	—
1278	— Disperse Red 179	—	—	—	—	—
1279	— Disperse Red 178	—	—	—	—	—
1280	— Disperse Red 177	—	—	—	—	—
1281	— Disperse Red 176	—	—	—	—	—
1282	— Disperse Red 167	—	—	—	—	—
1283	— Disperse Red 162	—	—	—	—	—
1284	— Disperse Red 161	—	—	—	—	—
1285	— Disperse Red 159	—	—	—	—	—
1286	— Disperse Red 140	—	—	—	—	—
1287	— Disperse Red 139	—	—	—	—	—
1288	— Disperse Red 138	—	—	—	—	—
1289	— Disperse Red 137	—	—	—	—	—
1290	— Disperse Red 136	—	—	—	—	—
1291	— Disperse Red 135	—	—	—	—	—
1292	— Disperse Red 133	—	—	—	—	—
1293	— Disperse Blue 60	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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(Continued)

TABLE 8-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1294	— Disperse Blue 62	—	—	—	—	—
1295	— Disperse Blue 61	—	—	—	—	—
1296	— Disperse Blue 71	—	—	—	—	—
1297	— Disperse Blue 70	—	—	—	—	—
1298	— Disperse Blue 64	—	—	—	—	—
1299	— Disperse Blue 8	—	—	—	—	—
1300	— Disperse Blue 35	012222752	—	—	—	—
1301	— Disperse Blue 55	—	—	—	—	—
1302	— Disperse Blue 54	—	—	—	—	—
1303	— Disperse Blue 121	—	—	—	—	—
1304	— Disperse Blue 120	—	—	—	—	—
1305	— Disperse Blue 119	—	—	—	—	—
1306	— Disperse Blue 118	—	—	—	—	—
1307	— Disperse Blue 117	—	—	—	—	—
1308	— Disperse Blue 116	—	—	—	—	—
1309	— Disperse Blue 112	—	—	—	—	—
1310	— Disperse Blue 109	—	—	—	—	—
1311	— Disperse Blue 102	—	—	—	—	—
1312	— Disperse Blue 95	—	—	—	—	—
1313	— Disperse Blue 94	—	—	—	—	—
1314	— Disperse Blue 87	—	—	—	—	—
1315	— Disperse Blue 86	—	—	—	—	—
1316	— Disperse Blue 81	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1317	— Disperse Blue 79	012239348	—	—	—	—
1318	— Disperse Blue 73	—	—	—	—	—
1319	— Disperse Red 35	—	—	—	—	—
1320	— Disperse Red 30	—	—	—	—	—
1321	— Disperse Red 21	—	—	—	—	—
1322	— Disperse Orange 98	—	—	—	—	—
1323	— Disperse Orange 94	—	—	—	—	—
1324	— Disperse Orange 91	—	—	—	—	—
1325	— Disperse Red 59	—	—	—	—	—
1326	— Disperse Red 55	—	—	—	—	—
1327	— Disperse Red 54	—	—	—	—	—
1328	— Disperse Red 78	—	—	—	—	—
1329	— Disperse Red 73	—	—	—	—	—
1330	— Disperse Red 66	—	—	—	—	—
1331	— Disperse Red 65	—	—	—	—	—
1332	— Disperse Red 117	—	—	—	—	—
1333	— Disperse Red 105	—	—	—	—	—
1334	— Disperse Red 96	—	—	—	—	—
1335	— Disperse Red 91	—	—	—	—	—
1336	— Disperse Red 90	—	—	—	—	—
1337	— Disperse Red 88	—	—	—	—	—
1338	— Disperse Red 86	—	—	—	—	—
1339	— Disperse Red 82	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	1645/1973	—	—
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—	—	—	—	145/1973	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD$_{50}$, mg/kg	Toxicology	TLV	Carcinogen
1340	–– Disperse Orange 16	—	—	—	—	—
1341	–– Disperse Yellow 131	—	—	—	—	—
1342	–– Disperse Yellow 125	—	—	—	—	—
1343	–– Disperse Yellow 116	—	—	—	—	—
1344	–– Disperse Yellow 96	—	—	—	—	—
1345	–– Disperse Yellow 95	—	—	—	—	—
1346	–– Disperse Orange 41	—	—	—	—	—
1347	–– Disperse Orange 38	—	—	—	—	—
1348	–– Disperse Orange 37	—	—	—	—	—
1349	–– Disperse Orange 30	—	—	—	—	—
1350	–– Disperse Orange 29	—	—	—	—	—
1351	–– Disperse Orange 25	—	—	—	—	—
1352	–– Disperse Orange 21	—	—	—	—	—
1353	–– Disperse Orange 17	—	—	—	—	—
1354	–– Disperse Orange 90	—	—	—	—	—
1355	–– Disperse Orange 89	—	—	—	—	—
1356	–– Disperse Orange 80	—	—	—	—	—
1357	–– Disperse Orange 79	—	—	—	—	—
1358	–– Disperse Orange 78	—	—	—	—	—
1359	–– Disperse Orange 77	—	—	—	—	—
1360	–– Disperse Orange 75	—	—	—	—	—
1361	–– Disperse Orange 67	—	—	—	—	—
1362	–– Disperse Orange 66	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
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(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1363	— Disperse Orange 65	—	—	—	—	—
1364	— Disperse Orange 62	—	—	—	—	—
1365	— Disperse Orange 59	—	—	—	—	—
1366	— Disperse Orange 58	—	—	—	—	—
1367	— Disperse Orange 57	—	—	—	—	—
1368	— Disperse Orange 44	—	—	—	—	—
1369	— Disperse Orange 42	—	—	—	—	—
1370	— Direct Blue 91	—	—	—	—	—
1371	— Direct Blue 100	—	—	—	—	—
1372	— Direct Blue 104	—	—	—	—	—
1373	— Direct Blue 143	—	—	—	—	—
1374	— Direct Blue 160	—	—	—	—	—
1375	— Direct Blue 191	—	—	—	—	—
1376	— Direct Blue 189	—	—	—	—	—
1377	— Direct Green 69	—	—	—	—	—
1378	— Direct Green 47	—	—	—	—	—
1379	— Direct Green 45	—	—	—	—	—
1380	— Direct Green 27	—	—	—	—	—
1381	— Direct Blue 199	—	—	—	—	—
1382	— Direct Blue 263	—	—	—	—	—
1383	— Direct Blue 224	—	—	—	—	—
1384	— Direct Blue 80	—	—	—	—	—
1385	— Direct Blue 24	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
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—	—	—	—	52.7/1973	—	—
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—	—	—	—	239/1973	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1386	— Direct Violet 67	—	—	—	—	—
1387	— Direct Violet 99	—	—	—	—	—
1388	— Direct Blue 6	002602462	—	—	—	—
1389	— Disperse Yellow 34	—	—	—	—	—
1390	— Disperse Yellow 33	012223846	—	—	—	—
1391	— Disperse Yellow 32	—	—	—	—	—
1392	— Direct Black 95	—	—	—	—	—
1393	— Disperse Yellow 2	—	—	—	—	—
1394	— Direct Black 190	—	—	—	—	—
1395	— Disperse Yellow 67	—	—	—	—	—
1396	— Disperse Yellow 69	—	—	—	—	—
1397	— Disperse Yellow 68	012223891	—	—	—	—
1398	— Disperse Yellow 50	—	—	—	—	—
1399	— Disperse Yellow 58	—	—	—	—	—
1400	— Disperse Yellow 56	—	—	—	—	—
1401	— Disperse Yellow 93	—	—	—	—	—
1402	— Disperse Yellow 89	—	—	—	—	—
1403	— Disperse Yellow 88	—	—	—	—	—
1404	— Disperse Yellow 87	—	—	—	—	—
1405	— Disperse Yellow 86	—	—	—	—	—
1406	— Disperse Yellow 85	—	—	—	—	—
1407	— Disperse Yellow 77	—	—	—	—	—
1408	— Disperse Yellow 74	012236338	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	54.1/1973	—	—
—	—	—	—	130/1973	—	—
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—	—	—	—	—	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1409	— Direct Brown 48	—	—	—	—	—
1410	— Direct Brown 11	—	—	—	—	—
1411	— Direct Brown 40	—	—	—	—	—
1412	— Direct Brown 1	003811710	—	—	—	—
1413	— Direct Black 37	—	—	—	—	—
1414	— Direct Black 44	—	—	—	—	—
1415	— Direct Brown 218	—	—	—	—	—
1416	— Direct Black 8	—	—	—	—	—
1417	— Direct Yellow 39	—	—	—	—	—
1418	— Direct Yellow 23	—	—	—	—	—
1419	— Basic Black 9	—	—	—	—	—
1420	— Basic Green 7	—	—	—	—	—
1421	— Basic Blue 97	—	—	—	—	—
1422	— Basic Green 3	—	—	—	—	—
1423	— Basic Blue 94	—	—	—	—	—
1424	— Basic Blue 87	—	—	—	—	—
1425	— Basic Blue 82	—	—	—	—	—
1426	— Basic Blue 77	—	—	—	—	—
1427	— Direct Yellow 63	—	—	—	—	—
1428	— Direct Yellow 105	—	—	—	—	—
1429	— Direct Yellow 103	—	—	—	—	—
1430	— Direct Yellow 84	—	—	—	—	—
1431	— Direct Yellow 81	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	17.7/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	119/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	69.1/1973	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1432	— Direct Yellow 107	—	—	—	—	—
1433	— Direct Yellow 117	—	—	—	—	—
1434	— Direct Yellow 114	—	—	—	—	—
1435	— Direct Yellow 127	—	—	—	—	—
1436	— Direct Yellow 120	—	—	—	—	—
1437	— Direct Yellow 119	—	—	—	—	—
1438	— Direct Yellow 118	—	—	—	—	—
1439	— Direct Orange 11	—	—	—	—	—
1440	— Direct Yellow 137	—	—	—	—	—
1441	— Direct Yellow 133	—	—	—	—	—
1442	— Direct Yellow 132	—	—	—	—	—
1443	— Direct Yellow 131	—	—	—	—	—
1444	— Direct Red 100	—	—	—	—	—
1445	— Direct Red 139	—	—	—	—	—
1446	— Direct Red 238	—	—	—	—	—
1447	— Direct Red 236	—	—	—	—	—
1448	— Direct Red 209	—	—	—	—	—
1449	— Direct Red 95	—	—	—	—	—
1450	— Direct Orange 59	—	—	—	—	—
1451	— Direct Orange 72	—	—	—	—	—
1452	— Direct Orange 67	—	—	—	—	—
1453	— Direct Orange 81	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	311/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	148/1973	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-3. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1454	–– Direct Orange 80	—	—	—	—	—
1455	–– Direct Orange 79	—	—	—	—	—
1456	–– Direct Orange 78	—	—	—	—	—
1457	–– Direct Orange 110	—	—	—	—	—
1458	–– Direct Orange 88	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

TABLE B-4. ADDENDUM

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
30a	CI11270 Solvent Orange 3	000532821*	—	—	—	—
54a	CI12070 Dark Pigment Red 1	006410102*	—	—	—	—
98a	CI13091 Acid Orange 1	—	—	—	—	—
137a	CI15530 Lake Pigment Orange 7	—	—	—	—	—
175a	CI16150 Lake Acid Red 26	003761533*	—	—	—	—
176a	CI16180 Lake Acid Red 17	005858333*	—	—	—	—
238a	CI19140 Lake Acid Yellow 23	001934210*	—	—	—	—
251a	CI20195 Pigment Acid Brown 14	—	—	—	—	—
358a	CI27201 Acid Red 115	006226808*	—	—	—	—
367a	CI28160 Pigment Direct Red 81	002610119	—	—	—	—
541a	CI40001 Pigment Direct Yellow 11	001325377	—	—	—	—
542a	CI40001 Pigment Direct Yellow 6	001325388	—	—	—	—
559a	CI41000 Pigment Basic Yellow 2	002465272	—	—	—	—
561a	CI41001 Pigment Basic Yellow 37	006358367	—	—	—	—

TO TABLE B-3

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Diazotization Coupling	4	Water: inorganic salts	—	39.5/1973	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
—	—	—	—	90.9/1973	—	—
See Item 30a	4	See Item 30a	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Ditto	4	Ditto	—	—	—	—
Condensation Precipitation Filtration	5	Water: brines containing small amounts of organic materials	—	—	—	—
Condensation Precipitation Filtration	5	Ditto	—	—	—	—
Condensation Filtration Precipitation	6,18	Water: brines contaminated with small amounts of organic materials, residual amounts of metal ions & lead sulfate	—	—	—	—
Ditto	6,18	Ditto	—	—	—	—

(Continued)

TABLE B-4. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
563a	CI42000 Fugitive Pigment Green 4	000569642*	—	—	—	—
567a	CI42025 Pigment Basic Blue 1	003521060	—	—	—	—
			—	—	—	—
582a	CI42090 D&C Blue 1	002650182	—	—	—	—
592a	CI42520 Pigment Basic Violet 2	003248917	—	—	—	—
593a	CI45235 Fugitive Pigment Violet 3	000804873	—	—	—	—
619a	CI42780 Lake Acid Blue 93	028983564	—	—	—	—
632a	CI45160 Lake Pigment Red 81	000989388	—	—	—	—
636a	CI45170 Fugitive Pigment Violet 1	001326030*	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Condensation Oxidation Crystallization Filtration	6	**Water:** brines contaminated with small amounts of organic materials. Also, lead sulfate is precipitated as a solid waste	—	—	—	—
Condensation Oxidation Crystallization Precipitation Filtration	6,18	See Item 559a	—	—	—	—
See Item 563a	6	See Item 563a	—	—	—	2) 330, 80
Oxidation Filtration	7	**Air:** possibly significant and hazardous amounts of toxic arylamines **Water:** brines contaminated with varying amounts of organic substances **Solids:** sludges containing large amounts of metal ions	—	—	—	—
Oxidation Filtration Benzylation	7	Ditto	—	265/1973	—	—
—	—	—	—	—	—	—
Condensation Cyclization Oxidation	11	**Water:** brines contaminated with small amounts of organic chemicals **Solid:** sludge of iron oxide	—	—	—	—
Precipitation Filtration Condensation	11,18	**Water:** brines contaminated with small amounts of organic chemicals & residual amounts of metal ions **Solid:** sludge of iron oxide	—	—	—	—

(Continued)

TABLE B-4. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
655a	CI45430 FD&C Red 3	000568638 (T C666 BO EVJ DI FI IR BVO& LI MO NI &NA-2)	1895 rat	LDLo:200 mg/kg, ivn-rat	—	—
719a	CI53290 Sulfur Black 11	—	—	—	—	—
739a	CI58055 Lake Pigment Violet 5	—	—	—	—	—
746a	CI59300 Pigment Vat Orange 3	004378614	—	—	—	—
749a	CI59710 Pigment Vat Orange 4	001324330	—	—	—	—
857a	CI71100 Pigment Vat Red 15	004216028	—	—	—	—
858a	CI71105 Pigment Vat Orange 7	004424060	—	—	—	—
910a	CI76076 Oxidation Base 8	—	—	—	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
Precipitation Filtration Halogenation	12,18	Water: halide and small amounts of highly colored products and residual amounts of metal ions	—	155/1973	—	—
Condensation	22	Water: brines containing inorganic sulfur compounds & small amounts of organic chemicals	—	—	—	—
—	—	—	—	70/1973	—	—
Halogenation	12	Water: hydrogen halide and small amounts of highly colored products	—	—	—	—
Ditto	12	Ditto	—	—	—	—
Amide Formation Filtration	40	Water: effluents containing organic chemicals, acetic acid, o-phenylenediamine, ethanol, and potassium hydroxide Solid: distillation residues	—	—	—	—
—	—	—	—	—	—	—
—	—	—	—	—	—	—

(Continued)

TABLE B-5. ORGANIC DYES AND PIGMENTS, INORGANICS-TOXICITY

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
1	Alumina hydrate	—	—	—	—	—
2	Aluminum acetate	—	—	—	—	—
3	Aluminum sulfate	010043013 (AL2 S-02-Q2* 3)	—	LD50:270 mg/kg, ipr-mus	—	—
4	Ammonium bisulfite (Ammonium hydrogen sulfite)	—	—	—	—	—
5	Ammonium molybdate	013106768	333 rat	No cases of human poisoning have been reported	USOS air: TWA 10.2 mg/m^3	—
6	Arsenic trioxide	001327533 (.As2.03)	20 rat	A rodenticide	USOS air: TWA 0.5 mg/m^3	—
7	Barium chloride	010361372 (BA G2)	—	LD50:54 mg/kg, ipr-mus	USOS air: TWA 806 ug/m^3 USOS air: TWA 0.5 mg/m^3	—
8	Boric acid	010043353 (QBQQ)	2660 rat	—	—	TDLo:8 gm/kg/50 W TFX:NEO ivg-mus
9	Chlorosulfonic acid	007790945 (H S-03 G)	—	Highly toxic	—	—
10	Chromium fluoride	—	LDLo:150 mg/kg gpg	—	—	—
11	Chromium formate	—	—	—	—	—
12	Chromium sulfate	010101538 (CR2 S-02-Q2* 3)	—	LDLo:85 mg/kg ivn-mus	—	—
13	Cobalt acetate	000071487 (WV1 & QV1 & -CO-)	—	LD50:25 mg/kg, ivn-rbt	—	—
14	Copper (powder)	—	—	—	—	—

PROCESS, WASTE, PRODUCTION AND USE DATA

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	—
—	—	—	—	—	—	3)373
—	—	—	—	—	—	2)59 3)377
—	—	—	—	—	—	3)463
—	—	—	—	—	—	2)750 3)393
—	—	—	—	—	—	2)126 3)422,420
—	—	—	—	—	—	2)148 3)432
—	—	—	—	—	—	2)231 3)467
—	—	—	—	—	—	2)320 3)555,1134
—	—	—	—	—	—	2)328 3)559
—	—	—	—	—	—	3)559
—	—	—	—	—	—	2)328 3)559
—	—	—	—	—	—	2)16
—	—	—	—	—	—	3)574

(Continued)

TABLE B-5. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
15	Copper ferrocyanide	—	—	—	—	—
16	Cupric chloride	001344678	140 rat	Used as a herbicide	USOS air: TWA 1 mg/m^3	—
17	Cupric oxide	—	—	Ditto	—	—
18	Hydrochloric acid	007647010	900 rbt	—	USOS air: TWA 5 ppm	—
19	Iodine	007553562 (11)	LDLo:2000 hmn	—	USOS air: TWA 0.1 ppm USOS air: TWA 1 mg/m^3	—
20	Iron (scrap)	—	—	—	—	Iron compounds, suspected carcinogens
21	Lead carbonate (basic)	000598630 (QVQ & -PB-)	—	—	USOS air: TWA 258 ug/m^3	—
22	Lead peroxide	001309600	—	—	USOS air: TWA 230 ug/m^3	—
23	Magnesium oxide (fume)	001309484	—	TCLo:400 mg/m^3 TFX:UNS ihl-hmn	USOS air: TWA 10 mg/m^3	—
24	Manganese chloride	007773015 (MN G2)	—	LDLo:210 mg/kg, scu-mus LD50:121 mg/kg, ipr-mus	—	—
25	Manganese dioxide	001313139	—	LDLo:45 mg/kg, ivn-rbt	—	—
26	Mercuric oxide	001344452	18 rat	Highly toxic	USOS air: TWA 0.05 mg/m^3	—
27	Nickel acetate	000373024 (QVI & 2 -NI-)	350 rat	—	USOS air: TWA 3 mg/m^3	TDLo:350 mg/kg/ 43WI, TFX:CAR ims-rat
28	Raney nickel catalyst	007440020 (.NI)	—	TDLo:15 mg/m^3/ 91WI, inh-gpg	USOS air: TWA 1 mg/m^3	TDLo:15 mg/kg/ 6WI, TFX:NEO scu-rat

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	--
—	—	—	—	—	—	2)344 3)573
—	—	—	—	—	—	3)575
—	—	—	—	—	—	2)619 3)816
—	—	—	—	—	—	2)645 3)18,832
—	—	—	—	—	—	3)836
—	—	—	—	—	—	2)677 3)861
—	—	—	—	—	—	Ditto
—	—	—	—	—	—	2)686 3)19,880
—	—	—	—	—	—	2)690 3)885
—	—	—	—	—	—	2)690 3)885
—	—	—	—	—	—	3)19,895, 900
—	—	—	—	—	—	2)790 3)954
—	—	—	—	—	—	2)790

(Continued)

TABLE B-5. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
29	Oleum (sulfuric acid)	007664939 (WSQQ)	2140 rat	TCLo:800 ug/m^3 TFX:MTH, ihl-hmn TCLo:350 ug/m^3 TFX:PUL, ihl-hmn	USOS air: TWA 1 mg/m^3	—
30	Phosgene	000075445 (GVG)	—	TDLo:25 ppm/30M TFX:IRR, ihl-hmn LC50:75 ppm/30M, ihl-rat	—	—
31	Phosphomolybdic acid	—	—	—	—	—
32	Phosphorus oxychloride	010025873 (P O GB)	380 rat	Highly toxic	—	—
33	Phosphorus pentachloride	010026138 (P G5)	660 rat	LCLo:120 ppm ihl-mus, highly caustic	USOS air: TWA 1 mg/m^3	—
34	Phosphorus trichloride	007719122 (P G3)	550 rat	LCLo:600 ppm/10M ihl-mus	USOS air: TWA 0.5 ppm USOS air: TWA 3 mg/m^3	—
35	Phosphotungstic acid, sodium salt	—	1600 rat	—	—	—
36	Potassium carbonate (anhydrous)	001303726	LDLo:160 mg/kg rat	Strong caustic	—	—
37	Potassium hydroxide	001310583 (KA Q)	365 rat	—	USOS air: TWA 2 mg/m^3	—
38	Potassium permanganate	007722647 (.KA.. MN-04)	1090 rat	—	—	—
39	Sodium bisulfite	007631905 (NA S-O-QZ)	—	Highly toxic LD50:650 mg/kg, ipr-rat	—	—
40	Sodium bromate	007789380 (NA E-02-Q)	—	LD50:140 mg/kg, ipr-mus	—	—
41	Sodium chlorate	007775099 (NA G-02-Q)	LDLo:1500 mg/kg rat	Used as an herbicide	—	—

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	2)1096 3)985
—	—	—	—	—	—	2)887 3)1021
—	—	—	—	—	—	—
—	—	—	—	—	—	2)924 3)1025,816
—	—	—	—	—	—	2)897 3)1025,816, 21
—	—	—	—	—	—	2)924 3)1027,816, 21
—	—	—	—	—	—	2)924 3)1027
—	—	—	—	—	—	2)950 3)1042
—	—	—	—	—	—	2)951 3)1047,21
—	—	—	—	—	—	2)846 3)1051
—	—	—	—	—	—	2)1062 3)1104,1131
—	—	—	—	—	—	2)234 3)471
—	—	—	—	—	—	2)306 3)1105

(Continued)

TABLE B-5. (Continued)

Item No.	Compound Name and Formula	Chem. Abstr. Registry No. (WLN)	Oral Toxicity, LD_{50}, mg/kg	Toxicology	TLV	Carcinogen
42	Sodium hyposulfite	—	—	—	—	—
43	Sodium nitrite	007632000 (NA N-O-Q)	85 rat	—	—	—
44	Sodium thiosulfate	—	—	Most thiosulfates have low toxicity	—	—
45	Stannous chloride	007772998 (SN G2)	700 rat	—	USOS Air: TWA 3.2 mg/m^3	—
46	Strontium chloride	010476854 (.SR..G2)	—	LD50:908 mg/kg, ipr-mus	—	—
47	Sulfamic acid	005329146 (2SWQ)	1600 ug/kg rat	—	—	—
48	Sulfur	007704349 (S)	—	Very low	—	—
49	Sulfur chloride	010025679 (S2 G2)	—	LCLo:150 ppm/1M ihl-mus	USOS air: TWA 1 ppm USOS air: TWA 6 mg/m^3	—
50	Sulfur monochloride	010025679	—	LCLo:150 ppm/1M ihl-mus	Ditto	—
51	Sulfuryl chloride	007791255 (S 02 G2)	—	Corrosive	—	—
52	Thionyl chloride	007719097 (S O G2)	—	Very toxic material and constitutes serious toxic hazards	—	—
53	Zinc	—	—	Not toxic unless heated	—	—
54	Zinc chloride	007646857 (.ZN..G2)	—	Fumes are highly toxic TCLo:4800 mg/m^3/30M TFX:PUL ihl-man LDLo:30 mg/kg, ivn-rat	USOS air: TWA 1 mg/m^3	TDLo:17 mg/kg TFX:NEO, par-ham

Process (Sources of Compound)	Process No.	Associated Wastes	Waste Treatment	Total Production 10^3 kg/year	Uses	References
—	—	—	—	—	—	3)111,1131
—	—	—	—	—	—	2)801 3)962,1114
—	—	—	—	—	—	3)1120
—	—	—	—	—	—	2)1133 3)1124
—	—	—	—	—	—	2)1082
—	—	—	—	—	—	2)1088 3)1130
—	—	—	—	—	—	2)1096 3)1132
—	—	—	—	—	—	2)1096 3)1132,21
—	—	—	—	—	—	Ditto
—	—	—	—	—	—	2)1098 3)1136
—	—	—	—	—	—	2)1126 3)1166
—	—	—	—	—	—	3)1252
—	—	—	—	—	—	2)1206 3)1251,22

APPENDIX C

KEY TO ABBREVIATIONS AND ACRONYMS USED IN TABLES IN APPENDICES A AND B

abs	- absorptions(s)
agn-	- agent(s)
alr	- allergenic effect(s)
aqtx	- aquatic toxicity
BCM	- blood clotting mechanism effects
bdw	- wild bird species
BLD	- blood effect(s)
BPR	- blood pressure effect(s)
brd	- bird (domestic or lab)
C	- continuous
cc	- cubic centimeter
CL	- ceiling concentration
CAR	- carcinogenic effect(s)
cat	- cat
chd	- child
chem	- chemicals
concen	- concentration(s)
ckn	- chicken
CNS	- central nervous system effects
COR	- corrosive effects
ctl	- cattle
CRIT DOC	- criteria document
CUM	- cumulative effects
CVS	- cardiovascular effects
D	- day
dck	- duck
DDP	- drug dependence effects
DEF	- definition
dog	- dog
EYE	- eye effects
frg	- frog
GIT	- gastrointestinal tract effects
GLN	- glandular effects
gm	- gram
gpg	- guinea pig
H	- hour
ham	- hamster
hmn	- human
inc	- including
I	- intermittent
IARC	- International Agency for Research on Cancer
ial	- intraaural
iat	- intraarterial
ice	- intracerebral
icv	- intracervical
idr	- intradermal
idu	- intraduodenal
ihl	- inhalation
imp	- implant
ims	- intramuscular
ind	- industry, industrial
inf	- infant
ing	- ingestion
int	- intermediate
ipc	- intraplacental
ipl	- intrapleural
ipr	- intraperitoneal
irn	- intrarenal
irr	- irritant effects
isp	- intraspinal
itr	- intratracheal
ivg	- intravaginal
ivn	- intravenous
ingred	- ingredient(s)
insec	- insecticide(s)
inhib	- inhibitor(s)
kg	- kilogram (one thousand grams)
L	- local
lacq	- lacquer
LC50	- lethal concentration 50 percent kill
LCLo	- lowest published lethal concentration
LD50	- lethal dose 50 percent kill
LDLo	- lowest published lethal dose
mam	- mammal (species unspecified)
man	- man
M	- minute
mtrl	- material(s)
muc	- mucous
m^3	- cubic meter
mfg	- manufacturing

ABBREVIATIONS
(Continued)

mfr - manufacturer
mg - milligram (one thousandth of a gram; 10^{-3} gm)
mky - monkey
mmi - mucous membrane effects
msk - muscolo-skeletal effects
mth - mouth effects
mem - membrane
mus - mouse
MUT - mutagenic effects

NEO - neoplastic effects
ng - nanogram (one billionth of a gram; 10^{-9} gm)

ocu - ocular
orl - oral
org - organic

par - parenteral
photo - photography, photograhic
pg - picogram (one trillionth of a gram; 10^{-12} gm)
pgn - pigeon
pig - pig
pk - peak concentration
PNS - peripheral nervous system effects
ppb - parts per billion (v/v)
pph - parts per hundred (v/v) (percent)
ppm - parts per million (v/v)
ppt - parts per trillion (v/v)
prep - preparation(s)
psy - psychotropic
pul - pulmonary system effects
pharm - pharmaceuticals

qal - quail

rat - rat
RBC - red blood cell effects
rbt - rabbit
rbr - rubber
rec - rectal
rec'd - recommended

scu - subcutaneous
skn - skin
skn abs- skin absorption
SKN - skin effects
sql - squirrel
syn - synthetic(s), synthesis
sup - super script
S - systemic effects
solv - solvent(s)

TCLo - lowest published toxic concentration
TDLo - lowest published toxic dose
TER - teratogenic effects
TFX - toxic effects
TLV - threshold limit value
tox rev- toxicology review
trk - turkey
TWA - time weighted average
TXDS - qualifying toxic dose

U - unknown
ug - microgram (one millionth of a gram; 10^{-6} gm)
unk - unreported
uns - toxic effects unspecified in source
USOS - U.S. Occupational Health Standard

W - week
wbc - white blood cell effects
WLN - Wisswesser Line Number
wmn - woman

Y - year

* - indicates closely related derivative of the Chem. Abst. Registry No. shown, such as a salt, free acid, free base or lake

APPENDIX D

INDUSTRIAL ORGANIC CHEMICALS - POSSIBLE ADDITIONS TO THE MASTER LIST

TABLE D-1. RADIAN LIST OF COMPOUNDS TO BE ADDED TO THE LIST OF INDUSTRIAL ORGANIC CHEMICALS(a)

Radian Number	Compound Name	WLN(b)
125	Acetyl chloride	GV1
185	Adiponitrile	NC4CN
190	Alkyl naphthalenes (methyl)	L66J C
235	p-Aminophenol(c)	ZR DQ
290	Amylphenol	QR X5
785	Caprolactam	T7MVTJ
905	Chlorobenzotrichloride (o, p)	GXGGR XC
950	o-Chloronitrobenzene	WNR BG
951	p-Chloronitrobenzene	WNR DG
995	Chlorotrifluoromethane	GXFFF
1021	Cresols, mixed	QR X
1170	Cyclooctadiene	L8U CUTJ *C *C
1200	m-Dichlorobenzene	GR CG
1230	1,2-Dichloroethane(d)	G1U1G
1495	Dimethylhydrazine	ZN1&1
1530	Dimethyl terephthalate	1OVR DVO1
1545	2,4-Dinitrophenol(f)	WNR BQ ENW
2091	Glycerol dichlorohydrin	Q1YG1G
2145	Hexachlorobenzene	G 6-R
2165	Hexamethylenediamine	Z6Z
2210	p-Hydroxybenzoic acid(g)	QVR DQ
2261	Isobutylene(h)	1YU1
2321	Isopentane	2Y
2455	Metanilic acid(i)	ZR CSWQ
2665	Methyl methacrylate	1UYVO1
2756	o-Nitroaniline(j)	ZR BNW
2757	p-Nitroaniline(k)	ZR DNW

(Continued)

TABLE D-1. (Continued)

Radian Number	Compound Name	WLN[b]
2930	Phenylanthranilic acid[l]	WVR BMR
3270	Tannic acid[m]	—
3349	Toluene	IR
3354	2,4-Toluenedissocyanate	OCNR B ENCO
3355	Toluene diisocyanate	OCNR X XNCO
3395	1,1,1-Trichloroethane	GXGG

(a) Radian list of compounds added to OCPDB (reference 12) and supplied to Battelle on 6/2/76.

(b) Wiswesser Line Notation.

(c) Item No. 645, Table B-2 (ODP-I).

(d) Compound meant to be ethylene dichloride; WLN - G1G1.

(e) See under Item No. 374, Table A-1 (IOC).

(f) Item No. 667, Table B-2 (ODP-I).

(g) Item No. 18, Table B-1 (ODP-R).

(h) Item No. 64, Table A-1 (IOC).

(i) Item No. 318, Table B-2 (ODP-I).

(j) Item No. 97, Table B-2 (ODP-I).

(k) Item No. 98, Table B-2 (ODP-I).

(l) Item No. 333, Table A-1 (IOC).

(m) Item No. 30, Table B-1 (ODP-R).

TABLE D-2. INDUSTRIAL ORGANIC CHEMICALS NOT ON THE IOC LIST OR ON TABLE E-1 - FROM A 1975 PETROCHEMICAL COMPILATION[a]

Compound Name	WLN
Acrylates[b]	--
(Methyl acrylate)	1OV1U1
(n-Propyl acrylate)	3OV1U1
(2-Ethyl hexyl acrylate)	4Y2&1OV1U1
Isophthalonitrile	NCR CCN
Lactic acid	QYVQ
Linear alkyl benzenes[c]	--
DL-Methionine	QVM2S1
Peracetic acid	QOV1
Propylene carbonate	T5OVOTJ D
Tetrahydrofuran	T5OTJ
Xylylene diisocyanate	OCNR X X XNCO

(a) IOC = Industrial Organic Chemicals. Compounds are taken from Hydrocarbon Processing (]975 Petrochemical Handbook issue), 54 (11), 76 D - 76 VV & 97-98, November, 1975, published by Gulf Publishing Co., Houston, Texas.

(b) Other acrylate esters may also be of sufficient importance to consider adding. Ethyl and n-butyl acrylates are already on the IOC list.

(c) Higher alkyl benzenes other than those already listed (toluene and ethyl benzene are on the IOC list); also some branched alkyl benzenes are commercial and should be added.

TABLE D-3. 1973 U.S. TARIFF COMMISSION REPORT COMPOUNDS NOT ELSEWHERE LISTED(a)

Compound	1973 Production, MM/lb(b)
Hexamethylenediammonium adipate (Nylon 66 salt)	770.4
Sorbitol	158.0
Melamine	118.6
Sodium carboxymethyl cellulose	68.5
2,6-di-tert-Butyl-p-cresol	32.0
Triethylene glycol monomethyl ether	29.1
Triethylene glycol monoethylene ether	23.4
Dipropyl amine	18.1
Butyl benzoate	12.9
Tetraethylene glycol	12.1
Lead naphthenate	11.6
Dibutyl maleate	11.2
Hexyl alcohol	9.8
Benzoyl peroxide	8.8
Dioctyl maleate	7.7
Salicylaldehyde	4.8
Dimethylaminoethanol	4.2
Lauroyl chloride	4.2
di-tert-Butyl peroxide	2.4
tert-Butyl peroxy benzoate	2.4
Dodecenylsuccinic anhydride	1.6
tert-Butyl peroxy-2-ethyl hexoate	1.4
4,4'-Methylenebis (N,N'-dimethyl aniline) (Michler's Ketone)	1.2
tert-Butyl peroxy pivalate	1.0
Diethylenetriamine(c)	-
Isopropyl ether(c)	-
Triethylenetetramine(c)	-

(a) Compounds produced commercially at 1 million pounds per year or greater.

(b) Millions of pounds/year (divide by 2,2 to obtain millions of kilograms/year).

(c) Sales of substantially more than 1 MM lb/year indicates similar production levels.

TABLE D-4. ADDITIONAL COMPOUNDS TO BE CONSIDERED FOR INCLUSION IN IOC TABLE A-1(a)

Benzidine
tert-Butyl hydroperoxide
Caprolactone
Tris(2,3-Dibromopropyl phosphate)
Dichloromethyl ether
Cyclohexanone oxime
Dimethyl acetamide
Dimethyl carbamoyl chloride(b)
Ethyleneiminee
Hexahydrophthalic anhydride
Hexamethyl phosphoric acid
  triamide (HMPT)(b)
3-Hexanone
8-Hydroxystearic acid
Lauryl alcohol
Methyl-n-amyl ketone
Methylene diisocyanate (MDI)
  (p,p'-diphenylmethane diisocyanate)
Nadic methyl anhydride
Paraformaldehyde
2-Pentanone
Piperidine
Stearic acid
Terephthalonitrile
Trimethylolpropane
s-Trioxane
Vinyl pyridines

(a) Randomly identified compounds that are now or have been commercially produced.

(b) Recently identified as potent carcinogens (Chemical Week, June 2, 1976, page 31).

TABLE D-5. COMPOUNDS NOT ALREADY INCLUDED WHICH ARE COVERED BY EFFLUENT LIMITATIONS GUIDELINES DEVELOPMENT DOCUMENTS - ORGANIC CHEMICAL INDUSTRY(a)

Acetin
  (Glyceryl monoacetate)
n-Butyl propionate
Calcium citrate
Calcium oxalate
Calcium stearate(b)
Calcium tartrate
Chloral
  (Trichloroacetic aldehyde)
Chloroprene
Citral
Citric acid
Citronellol(b)
Coumarin
Dichloroethyl sulfide
  (mustard gas)
Ethyl nitrite
Geraniol(b)
Hydrazine solutions(b)
Ionone(b)
Methyl ionone(b)
Methyl salicylate(b)
Monosodium glutamate
Oxalic acid
Pentachlorophenol
Saccharin
Silicones
  (Chlorosilanes)
Sodium citrate
Sodium pentachlorophenate
Tartaric acid
Terpineol
Thioglycolic acid
Tricresyl phosphate
Tridecyl alcohol
Triphenyl phosphate
Vanillin

(a) Compounds not already included in IOC Table A-1 or preceeding Tables 2-5.

(b) Compounds on the effluent guidelines priority list, i.e, recommended standards published in EPA-440/1-74-0099, April 1974 and EPA-440/1-75/045, November 1975.

TABLE D-6. ORGANIC CHEMICALS IN REFERENCE 1 BUT WITH NO PROCESS NUMBER - POSSIBLE ADDITIONS TO THE IOC LIST(a)

Aniline
o-Benzoylbenzoic acid(b)
Bis(Chloroisopropyl) ether
Cobalt toluate
Cresol ether
Diallyl ether
Diamyl sulfide
2,4-Dimethyl-1-1,3-dioxane
Ethyl formate
Ethyl phenanthrene
Furfural
Glycidaldehyde
Hexane
Isobutane
Methane
Methyl bromide
Methyl iodide
Naphthalene sodium sulfonate
o-Nitroanisole(c)
Oxalic acid
Pentachloroethane
Phenanthrene
α-Phenylethyl alcohol
Sodium ethoxide
Sodium glycolate
Sodium stearate
Stilbene
Terphenyl
2,4,6-Trichlorophenol
Trinitrophenol (Picric acid)

(a) Thirty-four organic chemicals are listed which appear in Chapter 6 reference (1) IPPEU-IOC, but which do not have process number assignments. These compounds should be considered for inclusion in the catalog as primary entrants and for addition to the list of compounds on which toxicity and process data are being assembled.

(b) Item No. 397, page B-33, Table B-2 (ODP-I).

(c) Item No. 123, page B-13, Table B-2 (ODP-I).

APPENDIX E

INDUSTRIAL ORGANIC CHEMICALS - EXTRACTION TABLES BASED ON TOXICITY AND PRODUCTION VOLUME DATA IN TABLE A-1

TABLE E-1. U.S. OCCUPATIONAL STANDARD (USOS) FOR CONCENTRATIONS IN AIR - INDUSTRIAL ORGANIC CHEMICALS

[Listed alphabetically according to compound]

Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm
3	200	39	10	71	150
7	10	48	0.1	72	500
8	5	49	1	73	5
9	1000	54	1	79	10
11	40	56	0.2	84	20, CL 30, PK 100/30M/8H
14	0.1	57	0.5	85	0.1(c)
15	0.3 mg/m^3 (skn)(b)	60	1000	86	10 (skn)
17	20 (skn)	61	500(c)	94	75
19	2 (skn)	65	150	101	50
20	1	66	200	111G	5 (skn)
24	100	67	200	111	5 (skn)
26	100	68	150	112	5 (skn)
30	5 (skn)	69	100	113	5 (skn)
32	0.5 mg/m^3 (skn)	70	CL 5 (skn)		

(Continued)

TABLE E-1. (Continued)

Compound Number	Concentration$^{(a)}$, ppm	Compound Number	Concentration$^{(a)}$, ppm	Compound Number	Concentration$^{(a)}$, ppm
114	2	164	1	202	10
116	50	167	1 mg/m^3 (skn)	203	20, CL 30, PK 50/5M/8H
122	300	168	1 mg/m^3 (skn)$^{(c)}$	204	50
123	50	176	100 (skn)	205	100, 260 mg/m$^{3(c)}$
124	50	178	10 mg/m^3	211	50 (skn)
125	300	179	1	213	200 (skn)
126	10 (skn)	185	5 (skn)	214	100 (skn)
129	50	187	1000	216	25 (skn)
133	CL 50	188	3	217	25 (skn)
134	75	189	400	221	50
135	1000	191	25	222	400
137	CL 15 (skn)	192	10	227	3, CL 5, PK 10/30M/8H
143	25	193	100	228	20
160	10	194	200	229	5
161	5 (skn)	196	1000	232	10 mg/m$^{3(c)}$
163	10 (skn)	201	5 (skn)		

(Continued)

TABLE E-1. (Continued)

Compound Number	Concentration[a], ppm	Compound Number	Concentration[a], ppm	Compound Number	Concentration[a], ppm
238	1 (skn)	275	200	302	1 (skn)
242	25[c]	276	10	306	100
243	10 (skn)	277	2 (skn)	307	100
244	2 mg/m^3	279	100, CL 200, PK 300/5M/3H	310	25
245	100	280	500	311	25
248	100	281	100	312	5 (skn)
249	150	282	100 (skn)	313	5 (skn)
255	25	284	500, CL 1000, PK 2000/5M/2H	314	5 (skn)
258	250	286	200	322	10 mg/m^3[c]
259	400	287	100	323	1000
260	5	288	25	327	100, CL 200, PK 300/5M/3H
263	0.5	289	100	328	0.1
265	0.25	292	CL 100	331	5 (skn)
267	25	294	20 (skn)	336	0.1 mg/m^3 (skn)
270	1 (skn)	295	10	337	0.1
273	200				

(Continued)

TABLE E-1. (Continued)

Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm
338	2	377	117/$\mu g/m^3$ (skn)	403	10
347	1000	387	5 (skn)	404	1, CL 5
350	200	391	10 (skn)	405	10(c)
355	75	392	100, CL 200, PK 300/5M/2H	406	100
356	100	393	1000	407	100(c)
357	5	394	50	408	100(c)
358	10(c)	395	1000	409	100(c)
368	100, CL 200, PK 600/5M/3H	397	25	415G	5 (skn)

(a) Time weighted average (TW) unless indicated otherwise.

(b) (skn) indicates additional absorption through the skin is possible even when the concentration is below the indicated standard.

(c) Not necessarily USOS.

TABLE E-2. U.S. OCCUPATIONAL STANDARD (USOS) FOR CONCENTRATIONS IN AIR - INDUSTRIAL ORGANIC CHEMICALS

[Listed according to increasing standard concentrations]

Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number
0.1	14	5 (skn)	111G	10(c)	405
0.2	48	5 (skn)	111	CL 15 (skn)	137
0.1(c)	85	5 (skn)	112	(skn)	17
0.1	328	5 (skn)	113	20	84
0.1	337	5 (skn)	161	20	203
0.2	7	5 (skn)	185	20	228
0.2	56	5 (skn)	201	20 (skn)	294
0.25	265	5	229	25	143
0.5	8	5	260	25 (skn)	216
0.5	57	5 (skn)	312	25 (skn)	217
0.5	263	5 (skn)	313	25(c)	242
1	20	5 (skn)	314	25	255
1	49	5 (skn)	331	25	267
1	54	5	357	25	288
1	164	5 (skn)	387	25	310
1 (skn)(b)	168	5 (skn)	415G	25	311
1	179	10	7	25	397
1 (skn)	238	10	39	40	11
1 (skn)	270	10	79	50	101
1 (skn)	302	10 (skn)	86	50	116

(Continued)

TABLE E-2. (Continued)

Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number
1	404	10 (skn)	126	50	123
2 (skn)	19	10	160	50	124
2	114	10 (skn)	163	50	129
2 (skn)	277	10	192	CL 50	133
2	338	10	202	50	204
3	188	10 (skn)	243	50	211
3	227	10	276	50	221
5	8	10	295	50	394
5 (skn)	30	10(c)	358	75	94
CL 5 (skn)	70	10 (skn)	391	75	134
5	73	10	403	100	26
100	24	100	406	500(c)	61
100	62	100(c)	407	500	280
100	69	100(c)	408	500	284
100	72	100(c)	409	1,000	9
100 (skn)	176	150	68	1,000	60
100	193	150	71	1,000	135
100(c)	205	150	249	1,000	187
100 (skn)	214	100	3	1,000	196
100	245	200	65	1,000	323

(Continued)

TABLE E-2. (Continued)

Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number	Concentration(a), ppm	Compound Number
100	248	200	66	1,000	347
100	279	200	67	1,000	393
100	281	200	194	1,000	395
100 (skn)	282	200 (skn)	213	0.1 (skn)	336
100	287	200	273	0.117 (skn)	377
100	289	200	275	0.3 (skn)	15
CL 100	292	200	286	0.5 (skn)	32
100	306	200	350	1 (skn)	167
100	307	250	258	1 (skn)	168
100	327	300	122	10	178
100	356	300	125	10(c)	232
100	368	400	222	10(c)	322
100	392	400	259		

(a) Time weighted average (TWA) unless indicated otherwise.

(b) (skn) indicates additional absorption through the skin is possible even when the concentration is below the indicated standard.

(c) Not necessarily USOS.

TABLE E-3. HUMAN TOXICITY DATA - INDUSTRIAL ORGANIC CHEMICALS

Compound Number[(a)]	TDLo	TCLo	LDLo	LCLo	TFX	Adm[(b)]
3	-	134 ppm	-	-	IRR	ihl
7	816 ppm/3M	-	-	-	IRR	ihl
9	-	500 ppm	-	-	EYE	ihl
"	-	12,000 ppm/4H	-	-	CNS	ihl
14	-	1 ppm	-	-	IRR	ihl
"	-	-	-	153 ppm/10M	-	ihl
17	16 ppm/20M	-	-	-	PUL	ihl
19	-	25 ppm	-	-	IRR	ihl
24	-	188 ppm/30M	-	-	IRR	ihl
30	-	-	350 mg/kg	-	-	orl
39	-	-	-	20,000 ppm/5M	-	ihl
"	-	210 ppm	-	-	BLD	ihl
44	6 mg/kg	-	-	-	SKN	skn
54	-	16 ppm	-	-	UNS	ihl
56	4400 mg/m^3	-	-	-	IRR	ihl
60	-	-	-	250,000 ppm/25M	-	ihl
62	-	25 ppm	-	-	PUL	ihl
64	-	200 ppm	-	-	IRR	ihl
79	-	10 ppm/3M	-	-	IRR	ihl
"	-	20 ppm/5M	-	-	CNS	ihl
80	-	580 mg/m^3	-	-	IRR	ihl

(Continued)

TABLE E-3. (Continued)

Compound Number[(a)]	TDLo	TCLo	LDLo	LCLo	TFX	Adm[(b)]
84	-	-	-	4,000 ppm/30M	-	ihl
"	-	50 mg/m^3/7Y	-	-	CNS	ihl
86	-	20 ppm	-	-	CNS	ihl
"	-	-	-	1,000 ppm	-	ihl
90	-	44 mg/m^3	-	-	BLD	ihl
101	-	10 ppm/1Y	-	-	SYS	ihl
114	-	12 mg/m^3/10M	-	-	IRR	ihl
123	-	100 ppm	-	-	MMI	ihl
124	-	50 ppm	-	-	IRR	ihl
132	-	25 μg/m^3	-	-	EYE	ihl
134	300 mg/kg	-	-	-	UNS	orl
163	-	200 ppm	-	-	CNS	ihl
176	-	-	-	470 ppm	-	ihl
185	20 ppm	-	-	-	EYE	ihl
187	-	-	2000 mg/kg	-	-	orl (chd)
"	-	-	6000 mg/kg	-	-	orl
"	50 mg/kg	-	-	-	GIT	orl
193	-	1,000 ppm	-	-	IRR	scu
196	-	13,000 ppm	-	-	CNS	ihl
201	-	-	5000 mg/kg	-	SKN	skn
202	-	200 ppm	-	-	IRR	ihl

(Continued)

TABLE E-3. (Continued)

Compound Number(a)	TDLo	TCLo	LDLo	LCLo	TFX	Adm(b)
204	-	-	845 mg/kg	-	-	orl
"	-	4,000 ppm/H	-	-	CNS	ihl
205	-	-	1500 mg/kg	-	-	orl
211	195 ppm/8H	-	-	-	IRR	ihl
216	-	25 ppm	-	-	CNS	ihl
227	-	-	36 mg/kg	-	-	orl (wmn)
"	-	13.8 ppm	-	-	IRR	ihl
243	-	-	750 µg/kg	-	-	orl
"	-	-	-	120 mg/m^3/1H	-	ihl
259	-	-	2371 mg/kg	-	-	orl
"	-	400 ppm	-	-	IRR	ihl
275	-	300 ppm	-	-	CNS	ihl
"	-	-	340 mg/kg	-	-	orl
"	100 mg/kg	-	-	-	EYE	orl
284	-	500 ppm/1YI	-	-	CNS	ihl
"	-	500 ppm/8H	-	-	BLD	ihl
290	7 mg/kg	-	-	-	PSY	orl
"	70 mg/kg	-	-	-	CNS	orl
295	-	-	100 mg/kg	-	-	orl (chd)
302	200 mg/kg	-	-	-	BLD	orl (wmn)
311	15 ppm	-	-	-	CNS	ihl
320	14 mg/kg	-	-	-	PSY	orl

(Continued)

TABLE E-3. (Continued)

Compound Number$^{(b)}$	TDLo	TCLo	LDLo	LCLo	TFX	Adm$^{(b)}$
320	14 mg/kg	-	-	-	PSY	ivn
"	71 mg/kg	-	-	-	PSY	ims
"	14 mg/kg	-	-	-	PSY	rec
323	-	130,000 ppm	-	-	CNS	ihl
327	-	230 ppm	-	-	SYS	ihl
"	-	280 ppm/2H	-	-	EYE	ihl
"	-	600 ppm/10M	-	-	CNS	ihl
328	-	45 ppm	-	-	EYE	ihl
"	-	-	-	483 ppm/10M	-	ihl
331	14 mg/kg	-	-	-	GIT	orl
"	-	-	140 mg/kg	-	-	orl
337	25 ppm/30M	-	-	-	IRR	ihl
350	-	-	5700 mg/kg	-	-	orl (wmn)
367	-	-	5000 mg/kg	-	-	unk
368	-	-	-	10,000 ppm/30M	-	ihl
"	-	600 ppm	-	-	IRR	ihl
"	-	376 ppm	-	-	CNS	ihl
"	-	20 mg/m^3	-	-	GLN	ihl (wmn)
392	-	160 ppm/83M	-	-	CNS	ihl
"	-	110 ppm/8H	-	-	-	ihl

(Continued)

TABLE E-3. (Continued)

Compound Number(b)	TDLo	TCLo	LDLo	LCLo	TFX	Adm(b)
395	-	4500 ppm	-	-	CNS	ihl
404	-	20 ppm	-	-	CVS	ihl

(a) Item number of compound in Industrial Organic Chemicals table.

(b) Method of administration (see list of abbreviations and acronyms).

TABLE E-4. CARCINOGENS OR SUSPECTED CARCINOGENS - INDUSTRIAL ORGANIC CHEMICALS

Compound Number(a)	TDLo	TCLo	TFX	Adm-Animal(b)
1	600 gm/kg/YI	--	NEO	skn-mus
5	456 gm/kg/52W	--	CAR	orl-rat
21	8400 mg/kg/84DI	--	NEO	orl-rat
35	16 mg/kg/24WI	--	NEO	orl-rat
36	90 gm/kg/90DC	--	NEO	orl-rat
36	72 gm/kg/90D	--	NEO	orl-rat
39	1232 mg/kg/52W	--	CAR	skn-mus
48	2000 mg/kg/28WC	--	NEO	skn-mus
54	50 mg/kg	--	NEO	scu-rat
54	2100 mg/kg/51WI	--	NEO	scu-rat
86	4800 mg/kg/88DI	--	CAR	orl-mus
86	133 gm/kg/25WI	--	NEO	scu-rat
86	3680 mg/kg/30WI	--	CAR	orl-ham
86	159 gm/kg/25WI	--	CAR	scu-rat
86	159 gm/kg/20WI	--	CAR	rec-mus
86	120 mg/kg/88DI	--	CAR	orl-mus
101	18 gm/kg/120DI	--	CAR	orl-mus
106	48 gm/kg/12WI	--	NEO	skn-mus
117	304 mg/kg	--	NEO	ihl-mus
117	10 gm/kg/76WI	--	NEO	scu-mus
121	22 gm/kg/73WI	--	NEO	orl-rat
121	18 mg/kg/73W	--	NEO	unk-rat
123	Suspected carcinogen-hmn	--	--	--
134	142 mg/kg/I	--	CAR	scu-mus
137	33 gm/kg/79WIC	--	CAR	orl-mus
141	2404 mg/kg/48WI	--	NEO	scu-mus
141	2400 mg/kg/44W	--	CAR	scu-mus
144	Suspected carcinogen of the bladder-hmn	--	--	--
156	1900 mg/kg/81WI	--	CAR	orl-rat
156	800 mg/kg/49WI	--	NEO	scu-rat
156	50 mg/kg	--	CAR	scu-rat
164	--	17 mg/m^3/18WI	CAR	ihl-rat
164	50 mg/kg	--	NEO	scu-rat
176	416 gm/kg/57WC	--	CAR	orl-rat
178	Recognized carcinogen-hmn	--	--	--
185	19 mg/kg	--	NEO	ihl-mus
185	720 mg/kg/18WI	--	NEO	scu-mus
187	340 gm/kg/57WI	--	CAR	orl-mus
187	100 gm/kg/18WI	--	CAR	rec-mus
205	4 gm/kg	--	NEO	skn-mus
227	1300 mg/kg/65WI	--	NEO	scu-rat

(Continued)

TABLE E-4. (Continued)

Compound Number[(a)]	TDLo	TCLo	TFX	Adm-Animal[(b)]
241	144 gm/kg/72WI	--	NEO	scu-rat
265	610 mg/kg/61W	--	CAR	scu-rat
285	80 mg/kg	--	CAR	orl-rat
285	1410 mg/kg	--	NEO	scu-rat
295	3500 mg/kg/98DI	--	NEO	scu-rat
320	12 gm/kg/W	--	NEO	skn-mus
328	--	15 mg/m^3/68WI	CAR	ihl-rat
329	Recognized carcinogen-hmn	--	--	--
330	Recognized carcinogen-hmn	--	--	--
331	4000 mg/kg/20WI	--	CAR	skn-mus
344	420 gm/kg/Y	--	CAR	ivg-mus
356	TDLo:1500 mg/kg/46WI	--	NEO	scu-rat
363	8600 mg/kg/19WI	--	NEO	scu-rat
367	2600 mg/kg/65W	--	CAR	scu-rat
377	86 mg/kg/28DI	--	CAR	scu-mus
382	11 gm/kg/36WC	--	CAR	orl-rat
386	6.6 mg/kg/19WI	--	NEO	orl-rat
387	870 mg/kg/78WC	--	NEO	orl-rat
392	351 gm/kg/78WI	--	CAR	orl-mus
404	--	250 ppm/4H/260DI	CAR	ihl-rat
404	--	250 ppm/35WI	CAR	ihl-mus
404	Liver carcinogen, mam, 500 ppm/4YI	--	CAR	ihl-man
410	5600 mg/kg/28WI	--	CAR	skn-mus
411	5600 mg/kg/28WI	--	CAR	skn-mus
412	5600 mg/kg/28WI	--	CAR	skn-mus
413	5600 mg/kg/28WI	--	NEO	skn-mus
414	4000 mg/kg/120WI	--	NEO	skn-mus
414	64,000/mg/kg/20WI	--	NEO	skn-mus

(a) Item number of compound in Industrial Organic Chemicals table.

(b) Method of administration and animal (see list of abbreviations and acronyms).

TABLE E-5. TERATOGENS AND MUTAGENS

Item No.	Compound	Mutagen	Teratogen	Carcinogen
IOC 86	carbon tetrachloride		TCLo:300 ppm (6-15D preg) TFX:TER, ihl-rat	potent animal carcinogen, orl
IOC 101	chloroform		TCLo:100 ppm/7H (6-15D preg) TFX:TER, ihl-rat	animal carcinogen, orl
IOC 156	diethyl sulfate		TDLo:85 mg/kg (15D preg), TFX:TER, ivn-rat	potent carcinogen orl or scu
IOC 164	dimethyl sulfate		TDLo:20 mg/kg (15D preg), TFX:TER, ivn-rat	potent carcinogen ihl or scu
IOC 166	dimethyl sulfoxide		TDLo:5 gm/kg (6-12D preg), TFX:TER, orl-rat	
			TDLo:8 gm/kg (6-12D preg), TFX:TER, ipr-rat	
			TDLo:50 mg/kg (8D preg), TFX:TER, ivn-ham	
IOC 178	diphenylamine		TDLo:7500 mg/kg (17-22D preg), TFX:TER, orl-rat	recognized carcinogen

(Continued)

TABLE E-5. (Continued)

Item No.	Compound	Mutagen	Teratogen	Carcinogen
IOC 187	ethanol		TDLo:7500 mg/kg (9D preg) TFX:TER	animal carcinogen, orl or rec
IOC 204	ethylene dichloride	experimental mutagen 3)658	experimental teratogen 3)658	experimental carcinogen 3)658
IOC 221	ethylene oxide	TDLo:30 mg/m^3 TFX:MUT, ihl-man		
IOC 228	formamide		TDLo:6 gm/kg (11-160D preg) TFX:TER, ipr-rat	
IOC 286	methyl ethyl ketone		TDLo:1000 ppm (6-15D preg) TFX:TER, ihl-rat	
IOC 406	vinyl toluene		TCLo:29 mg/m^3/13WI TFX:TER ihl-gpg	
IOC-ADD[a] 7	2,6-di-tert butyl-p-cresol		TDLo:5500 mg/kg (preg) TFX:TER, orl-rat	
IOC-ADD 18	chloroprene	TDLo:39 mg/m^3/4H/ 48D TFX:MUT, ihl-rat		
IOC-ADD 29	N,N-dimethyl acetamide		TDLo:600 mg/kg (preg) TFX:TER, ipr-rat	

(Continued)

TABLE E-5. (Continued)

Item No.	Compound	Mutagen	Teratogen	Carcinogen
IOC-ADD 42	hexachlorobenzene		TDLo:500 mg/kg (7-11D preg) TFX:TER, orl-mus	
IOC-ADD 65	methyl salicylate		TDLo:500 mg/kg (6 preg) TFX:TER, scu-rat	
DPD[b] 177	CI 16185 Acid Red 27		LDLo:1500 μ/kg (preg) TFX:TER, orl-rat	yes orl-rat
DPD 280	CI 22120 Direct Red 28		TDLo:80 mg/kg/ (8D preg) TFX:TER, unk-rat	
DPD 316	CI 23850 Direct Blue 14		TDLo:25 mg/kg/ (8D preg) TFX:TER, scu-mus	potent carcinogen scu-rat

(a) IOC-ADD are industrial organic chemicals-addendum (cf Table A-2, Appendix A)

(b) Dye and pigment dye (cf Table B-3).

TABLE E-6. ORAL TOXICITY (LD50, ORAL-RAT) VERSUS PRODUCTION VOLUME, WASTE AND CARCINOGEN DATA - IOC

Rating Order	IOC Item Number(a)	LD50, mg/kg	Carcinogen(b)	1973 Production(c), MM kg	Waste(d)	
					W	A
			1 to 50(e)			
1	10	17	--	245/1969		+
2	166	20	T	--	--	
3	14	46	--	28/1974		+
			51 to 100			
4	19	54	--	--	+	+
5	20	64	--	395/1970		+
6	137	75	+	--	--	
7	89	76	--	29.1/1969	--	
8	364	76	--	--	--	
9	17	82	--	614.8		+
10	328	83	+	--	--	
11	185	90	+	81.7		+
12	201	95	--	--		+
			101 to 300			
13	48	120	+	--	--	
14	112	121	--	11.2	--	
15	203	140	--	150.3		+
16	15	170	--	18.2	--	
17	175	177	--	--	--	
18	72	180	--	508.5	--	
19	375	200	--	--		+
20	113	207	--	--	--	
21	354	220	--	--	--	
22	111	242	--	--		+
23	140	250	--	--	--	
24	270	250	--	--		+
25	173	268	--	--	--	
26	251	280	--	--	--	
27	104	288	--	64/1974		+
28	414	296	+	--	--	
29	12	300	--	1.0	--	
30	90	300	--	--	--	
31	114	300	--	--		+
32	290	300	--	--	--	
			301 to 500			
33	358	301	--	11.8/1970		+
34	394	320	--	--	--	
35	244	320	--	8.1		+

(Continued)

TABLE E-6. (Continued)

Rating Order	IOC Item Number[a]	LD50, mg/kg	Carcinogen[b]	1973 Production[c], MM kg	Waste[d]	
					W	A
36	221	330	M	1890	--	
37	16	340	--	59.7	--	+
38	285	347	+	91	--	
39	309	350	--	--	--	
40	141	373	+	--	--	
41	71	380	--	205.6	--	
42	117	382	+	--	--	
43	297	400	--	--	--	
44	192	400	--	25.2/1972		+
45	225	400	--	--	--	
46	291	400	--	--	--	
47	384	400	--	--		+
48	331	414	+	1019	--	
49	346	419	--	38.8	--	
50	30	440	--	207.8		+
51	164	440	+,T	--	--	
52	411	444	+	--	--	
53	397	460	--	--	--	
54	416	467	--	--		+
55	27	470	--	--	--	
56	265	481	+	128	+	+
57	121	485	+	--	--	
58	138	490	--	--	--	
59	70	500	--	58.1		+
60	83	500	--	--	--	
61	133	500	--	--	--	
62	134	500	+	28.5	--	
63	404	500	+	2432	--	
64	412	500	+	--	--	
			501 to 700			
65	165	535	--	--	--	
66	143	540	--	5/1972		+
67	159	560	--	--	--	
68	105	570	--	--		+
69	392	580	--	193.0/1974		+
70	49	600	--	--	--	
71	413	608	+	--	--	
72	132	648	--	--	--	
73	106	670	+	--	--	
74	204	680	--	4210		+
75	160	698	--	55.2	--	
			701 to 1000			
76	174	707	--	--	--	
77	264	708	--	--	--	

(Continued)

TABLE E-6. (Continued)

Rating Order	IOC Item Number[a]	LD50, mg/kg	Carcinogen[b]	1973 Production[c], MM kg	Waste[d] W	Waste[d] A
78	142	710	--	48.3	--	
79	126	710	--	--	--	
80	73	735	--	1.82		+
81	390	756	--	--	--	
82	202	760	--	30/1974		+
83	70	790	--	235.5		+
84	6	800	--	1.8	--	
85	101	800	+	115		+
86	227	800	+	2918		+
87	260	820	--	--	--	
88	191	830	--	125.1	+	+
89	418	840	--	--	--	
90	91	880	--	--	--	
91	156	880	+, T	--	--	
92	41	890	--	--	--	
93	312	891	--	--	--	
94	357	891	--	3.4/1968	--	
95	360	891	--	18.9		+
96	387	900	+	--	--	
97	356	930	+	797		+
98	415	933	--	--	--	
99	307	940	--	--	--	
100	284	945	--	236	+	+
101	386	974	+	--	--	
102	115	1,000	--	--	--	
			1001 to 1500			
103	191	1,020	--	125	+	+
104	294	1,050	--	--	--	
105	321	1,070	--	--	--	
106	31	1,072	--	--	--	
107	314	1,072	--	--	--	
108	306	1,100	--	--	--	
109	267	1,120	--	--	--	
110	172	1,122	--	--		+
111	229	1,210	--	24.2		+
112	51	1,230	--	5.9	--	
113	54	1,231	+	36.5/1972		+
114	219	1,260	--	--	--	
115	417	1,297	--	--	--	
116	263	1,300	--	--	--	
117	37	1,300	--	--	--	
118	245	1,300	--	--	--	
119	33	1,400	--	0.9	--	
120	348	1,400	--	--	--	

(Continued)

TABLE E-6. (Continued)

Rating Order	IOC Item Number[a]	LD50, mg/kg	Carcinogen[b]	1973 Production[c], MM kg	Waste[d]	
					W	A
121	288	1,410	--	15.9	--	
122	111G	1,454	--	26.1		+
123	211	1,480	--	62.4		+
124	215	1,480	--	--	--	
125	254	1,480	--	22.4		+
126	79	1,500	--	--	--	
			1501 to 2000			
127	349	1,510	--	27.4		+
128	320	1,530	+	--		+
129	102	1,540	--	--	--	
130	372	1,540	--	--	--	
131	124	1,620	--	289.7		+
132	316	1,620	--	49		+
133	281	1,660	--	--	--	
134	53	1,700	--	--	--	
135	222	1,700	--	33		+
136	8	1,780	--	758.2		+
137	295	1,780	+	272.6	--	
138	340	1,860	--	--	--	
139	350	1,870	--	42.1		+
140	355	1,900	--	--	--	
141	3	1,930	--	657.2/1972	+	+
142	304	1,960	--	--	--	
143	235	2,000	--	--	--	
			2001 to 3000			
144	123	2,060	+	325.5/1968	--	
145	103	2,078	--	--	--	
146	289	2,080	--	70.3		+
147	188	2,100	--	40.2		
148	284	2,136	--	236		+
149	184	2,140	--	--	--	
150	282	2,140	--	--	--	
151	313	2,144	--	--	--	
152	4	2,180	--	--	--	
153	255	2,330	--	--	--	
154	299	2,420	--	--	--	
155	216	2,460	--	39.1		+
156	248	2,460	--	60.2	--	
157	80	2,490	--	216		+
158	298	2,590	--	--	--	
159	42	2,710	--	--	--	
160	250	2,810	--	--	--	
161	308	2,828	--	--		+

(Continued)

TABLE E-6. (Continued)

Rating Order	IOC Item Number[a]	LD50, mg/kg	Carcin-ogen[b]	1973 Production[c], MM kg	Waste[d] W	Waste[d] A
162	378	2,860	--	--	--	
163	94	2,910	--	180.5		+
164	116	2,910	--	1210	--	
165	224	2,920	--	--	--	
166	403	2,920	--	683	+	+
167	81	2,940	--	--		+
168	177	3,000	--	--	--	
169	23	3,000	--	--	--	
170	213	3,000	--	86.5		+
171	274	3,000	--	--	--	
172	283	3,000	--	--	--	
			3001 to 5000[e]			
173	24	3,030	--	5.4		+
174	25	3,030	--	--	--	
175	44	3,040	--	36.8/1974		+
176	223	3,200	--	182.5		+
177	410	3,200	+	--	--	
178	55	3,249	--	--	--	
179	78	3,250	--	--	--	
180	207	3,250	--	--	--	
181	56	3,280	--	2.3/1971	--	
182	7	3,310	--	1104	--	
183	179	3,370	--	--	--	
184	217	3,390	--	--	--	
185	286	3,400	--	246		+
186	69	3,500	--	--	--	
187	193	3,500	--	2580	--	
188	361	3,530	--	--	--	
189	34	2,700	--	--	--	
190	68	3,730	--	38		+
191	11	3,800	--	--		+
192	39	2,800	+	--	--	
193	145	3,900	--	--	--	
194	190	3,980	--	--	--	
195	129	4,000	--	--	--	
196	88	4,000	--	378.9	--	
197	242	4,000	--	20.9	--	
198	338	4,020	--	465	--	
199	57	4,040	--	145	+	+
200	362	4,100	--	5.4	--	
201	127	4,170	--	--		+
202	208	4,390	--	--	--	
203	35	4,620	+	--	--	
204	2	4,700	--	--	--	

(Continued)

TABLE E-6. (Continued)

Rating Order	IOC Item Number[a]	LD50, mg/kg	Carcinogen[b]	1973 Production[c], MM kg	Waste[d]	
					W	A
205	301	4,700	--	--	--	
206	128	4,720	--	--	--	
207	220	4,890	--	--	--	
208	292	4,900	--	23.8	--	
209	152	4,920	--	--	--	
210	392	4,920	+	205		+
211	368	5,000	--	2716	+	+
212	407	5,000	--	2627/1974	--	
213	409	5,000	--	1057	--	

(a) Item number of compound in Industrial Organic Chemicals Table A-1.

(b) A plus (+) indicates that this compound is a known or suspected carcinogen; M indicates mutagen; and T indicates teratogen.

(c) A dash (--) indicates no production data available. A number followed by a year indicates no 1973 data, but instead data for another year.

(d) Quantitative waste data on specific compounds available. W = effluent data, and A = air or emissions data.

(e) There are 32 compounds (item numbers) with LD50-orl, rat >5000 mg/kg not shown on this table.

TABLE E-7. ORAL TOXICITY (LD50, ANIMAL OTHER THAN RAT VALUES ≦ 500 mg/kg) VERSUS PRODUCTION VOLUME, WASTE AND CARCINOGEN DATA - IOC

Rating No.	IOC Item No.[(a)]	LD50 mg/kg	Carcinogen[(b)]	1973 Production, MM kg	Waste[(c)]	
					W	A
1	167	42 bdw	--	--		
2	388	42 bdw	--	--		
3	265	60 mus	+	128	+	+
4	340	65 mus	--	--		
5	41	75 bdw	--	--		
6	383	75 bdw	--	--		
7	19	96	--	--		
8	25	200 mus	--	--		
9	74	225 dog	--	--		
10	160	240 rbt 316 mus	--	55		
11	91	256 mus	--	--		
12	227	260 gpg	+	2918		
13	331	300 mus	+	1019		
14	368	316 mus	--	--		
15	314	330 mus	--	--		
16	202	470	--	30		
17	413	477 mus	+	--		

(a) Item number of compound in Table A-1. Two compounds (167, 383) do not have any oral-rat data. IOC's 19, 265, and 331 have LD50 oral-rat data < 500 mg/kg. The other 14 compounds have LD50, oral-rat values > 500 mg/kg.

(b) A plus (+) indicates the compound is a known or suspected carcinogen.

(c) Quantitative waste data on specific compounds in effluent (W) and air or emissions (A) are available for marked (+) compounds.

TABLE E-8. ORAL TOXICITY (LDLo, ALL ANIMALS) VERSUS PRODUCTION VOLUME, WASTE AND CARCINOGEN DATA - IOC

Rating Order	IOC Item No.[(a)]	LDLo, mg/kg	Carcinogen	1973 Production MM kg	Waste W	Waste A
1	377	17 rat	+	160		+
2	168	29 cat	--	--		
3	334	80 rat	--	--		
4	235		--	--		
5	336	100 rat	--	--		
6	350	140 mus	--	42		+
7	132	113 cat	+	--		
8	259	192 mus	--	--		
9	310	250 rbt	--	--		
10	277	280 rbt	--	17		
11	387	300 cat	+	--		
12	236	500 rbt	--	204		
13	271	500 mus	--	--		
14	311	500 rat	--	--		
15	382	500 rat	+	88	+	
16	412	500 rat	+	--		

(a) Item number of compound in Industrial Organic Chemicals Table A-1. Only the 16 compounds that do not have LD50, orl-rat data $\leq$ 500 mg/kg are shown. There are a total of 24 compounds that do not have LD50 orl-rat.

(b) A plus (+) indicates this compound is a known or suspected carcinogen.

(c) A minus (-) indicates no production data.

(d) Quantitative waste data on specific compounds in effluent (W) and air emissions (A) available.

(e) Special note-human data.

TABLE E-9. INHALATION LC50 DATA VERSUS CARCINOGEN, PRODUCTION, AND EMISSION DATA[a]

Rating Order[b]	IOC Item No.	LC50, ppm/H/animal[c]	Carcinogen[d]	1973 Production, MM kg	Emission Data[e]
1	377	6/ /rat	+	160	+
2	101	59/ /rbt 28/ /mus	+	115	+
3	337	75/0.5/rat 110/0.5/mus 114/0.5/gpg 1,087/1m/mgy	-	331	-
4	119	118/0.5/rat			
5	54	150 ppm/2H/rat			
6	19	165 ppm/4H/rat			
7	243	169/0.5/mus	-	138	-
8	117	220/4/rat	-	-	-
9	30	250 ppm/rat			
10	270	328/4/rat 36/4/mus	-	-	+
11	17	576/4/gpg	-	615	+
12	10	575/2/mus	-	245	+
13	211	700/7/mus	-	62	+
14	275	1,000/ /mky	-	3210	+
15	221	1,462/4/rat 836/4/mus 960/4/dog	M	1890	-
16	51	1,000/8/rat	-	6	-
17	189	1,000/ /rat	-	100	+
18	55	(200 mg/m^3/ /mus)	-	-	-
19	356	1,740/4/mus	+	797	+
20	351	2,310/4/rat	-	1.6[f]	-
21	61	(658 mg/m^3/ /rat)	-	-	-
22	143	4,000/4/rat	-	5	-
23	202	4,000/8/rat	-	30	+
24	7	5,620/1/mus	-	1104	-
25	216	(1,340 mg/kg/ /rbt)	-	39	+
26	114	(1,510 mg/m^3/2/mus)	-	-	+
27	116	8,000/4/rat	-	1210	-
28	39	10,000/17/rat	+	5130	-
29	272	(2,000 mg/m^3/24/rat)	-	-	-
30	86	9,526/8/mus	+	476	-
31	128	(4,000/mg/m^3/ /mus)	-	-	-

Footnotes appear on following page.

Footnotes for Table E-9.

(a) All compounds with inhalation lethal concentration, 50 percent test animal population data from Table A-1.

(b) Approximate ordinal ranking based on inhalation toxicity (i.e, in order of lowest lethal concentrations); different exposure times/animals makes ranking only approximate.

(c) Parts per million/hours/animal. Blank spaces indicated data not available. Data in parentheses are milligrams/cubic meter.

(d) Carcinogen or neoplasm (M = mutagen).

(e) Specific compound quantitative emission data in Table A-1 in lb/ton. No quantitative effluent data are available on these compounds.

(f) 1974.

TABLE E-10. TOXICITY DATA ≦ 500 MG/KG OR ≦ 1000 PPM NOT INCLUDED IN TABLES F-6 THROUGH F-9 -- ANY ANIMAL OR ADMINISTRATION ROUTE

IOC Item No.	Toxic Dose, mg/kg(a)	Carcin-ogen	1973 Production MM kg	Waste W	Waste A
3	LDLo: 500 ipr-rat	-	657	+	+
4	LD50: 140 skn-rat	-	-	-	-
8	LCLo: 1000 ppm/4H, ihl-rat	-	758	-	+
17	LCLo: 500 ppm/4H, ihl-rat	-	615	-	+
20	LCLo: 290/8H, ihl-rat	-	395(b)	-	+
21	LDLo: 500 ipr-mus	+	-	-	-
46	LDLo: 180 scu-mus	-	-	-	+
49	LDLo: 125 ppm/4H, ihl-rat	-	-	-	-
57	LD50: 150 ipr-mus	-	145	+	+
83	LCLo: 400 ppm, ihl-rat	-	-	-	-
85	LD50: 298 scu-mus	-	-	-	-
86	LDLo: 125 mg/kg, ivn-dog	+	476	-	-
88	LDLo: 4 ipr-mus	-	-	-	-
90	LDLo: 310 scu-cat	-	-	-	-
105	LD50: 355 ipr-rat	-	-	-	-
126	LD50: 200 ipr-rat	-	-	-	+
127	LCLo: 500 ppm/2H, ihl-rat	-	-	-	+
133	LCLo: 707 ppm/7H, ihl-rat	-	34	-	+
137	LCLo: 1000 ppm/45M, ihl-rat	+	-	-	-
138	LCLo: 125 ppm/4H, ihl-rat	-	-	-	-
140	LCLo: 260 ppm, ihl-rat	-	-	-	-
152	LD50: 150 skn-rbt	-	-	-	-
156	LD50: 340 ivn-rat LCLo: 250 ppm/4H, ihl-rat	+	-	-	-
164	LCLo: 75 ppm/17M, ihl-mus	+	-	-	-
176	LCLo: 470 ppm, ihl-hmn	+	7	-	-
180	LD50: 500 ipr-mus	-			
185	LCLo: 250 ppm/4H, ihl-rat	+	229	-	+
192	LD50: 390 dkn-rbt	-	25	-	+
201	LCLo: 32 ppm/4H, ihl-rat	-	-	-	-
203	LCLo: 400 ppm/2H, ihl-rat				
204	LDLo: 500 scu-rat LCLo: 1000 ppm/4H, ihl-rat	-	4210	-	+
211	LCLo: 500 ppm/4H, ihl-rat	-	62	-	+
227	LCLo: 250 ppm/4H, ihl-rat	+	2918	-	+
229	LD50: 145 ivn-mus	-	-	-	-
230	LD50: 200 ipr-mus	-	-	-	+
263	LCLo: 53 ppm/100 M, ihl-rat	-	-	-	-
267	LCLo: 1000 ppm/4H, ihl-rat	-	-	-	-
268	LD50: 49 ipr-mus	-	31	-	-

(Continued)

TABLE E-10. (Continued)

IOC Item No.	Toxic Dose, mg/kg[(a)]	Carcinogen	1973 Production MM kg	Waste W	Waste A
273	LCLo: 67 mg/m^3/56M, ihl-cat	-	-	-	-
284	LDLo: 200 ivn-dog	-	236	-	+
294	LD50: 500 skn-rbt	-	-	-	-
295	LD50: 150 ipr-mus	+	164	-	-
299	LDLo: 100 scu-mus	-	-	-	-
302	LDLo: 150 ivn-dog	-	140	-	-
308	LDLo: 100 ivn-dog	-	-	-	+
311	LCLo: 714 ppm/5H, ihl-cat	-	-	-	-
327	LDLo: 85 ivn-dog	-	321	-	-
331	LD50: 250 ipr-rat LD50: 344 scu-mus	+	1019	+	+
354	LCLo: 500 ppm/4H, ihl-rat				
361	LD50: 335 ivn-mus	-	-	-	-
375	LCLo: 1000 ppm/4H, ihl-rat	-	-	-	+
378	LCLo: 275 ppm/8H, ihl-gpg	-	-	-	-
386	LD50: 150 ipr-mus	+	-	-	-
391	LD50: 227 scu-mus LCLo: 500 ppm/8H, ihl-rat	-	170(c)	-	+
392	LDLo: 150 ivn-dog	+	205	-	+
394	LCLo: 1000 ppm/4H, ihl-rat	-	-	-	-
397	LCLo: 1000 ppm/4H, ihl-rat	-	13	-	+
403	LDLo: 500 ipr-rat	-	683	-	-
405	LDLo: 225 ivn-dog	-	77	-	+

(a) Chemical administration units in mg chemical/kg body weight unless otherwise indicated in table; inhalation data given in ppm/time, ihl-animal.

(b) 1970.

(c) 1971.

TABLE E-11. TOTAL PRODUCTION - INDUSTRIAL ORGANIC CHEMICALS

[Listed alphabetically according to compound]

Compound Number(a)	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
3	-	657.2 (1447.6)	-	-	-
6	-	-	1.8 (4.0	-	-
7	-	1014.9 (2235.4)	1104 (2429)	1033.7 (2580)	954 (2100)
8	-	-	758.2 (1670)	800 (1760)	651 (1520)
9	-	-	904 (1989)	900 (1980)	723 (1591)
10	245.2 (540) -	-	-	-	-
11	-	-	68 (150)	-	-
12	-		1.0 (2.2)	1.2 (2.7)	-
13	-	-	-	230.2 (507)	-
14	-	-	-	27.7 (61)	-
15	-	-	18.2 (40)	-	-
16	-	-	59.7 (131.6)	431 (948) inclesters	-
17	-	-	614.8 (1354.2)	642 (1412)	552 (1215)
18	-	-	711 (1567)	754 (1630)	668 (1470)
20	395 (870) -1970	-	-	-	-
23	-	-	-	6.1 (13.5)	-
24	-	-	5.4 (12)	-	-
30	-	-	207.8 (457.6)	250 (551)	187 (412)
33	-	-	0.9 (2.0)	-	-
39	-	-	5130 (11,300)	4587 (10,091)	3482 (7660)
44	-	-	-	36.8 (81)	-

(Continued)

TABLE E-11. (Continued)

Compound Number(a)	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
47	-	-	0.33 (0.74)	0.43 (0.95)	-
51	-	-	5.9 (12.9)	6.3 (13.9)	-
53	-	-	-	0.64 (1.42)	-
54	-	36.5 (80.4)	-	-	-
56	2.3 (5) - 1971		35.5 (77.9)	-	-
57			145.1 (319.7)	171.1 (376.8)	-
60	-	-	-	1674 (3682)	1202 (2645)
62G	10,074 (22,190)-	-	-	-	-
62	-	-	-	494 (1087)	-
65	-	-	36.8 (81.0)	-	-
66	24.9 (54.9) - 1967		-	-	-
68	-	-	58.1 (128.0)	-	-
70	-	-	235.5 (518.6)	254 (558)	155 (341)
71	-	-	205.6 (453)	-	-
72	-	-	508.5 (1120)	-	-
73	-	-	1.82 (4)	-	-
80	-	-	216 (477)	-	-
84	-	-	352.9 (777.4)	-	-
86	-	-	476 (1047)	-	-
87	-	-	378.9 (834.5)	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number$^{(a)}$	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
89	29.1 (64.2) - 1969	--	-	-	-
94	-	-	180.5 (397.5)	-	-
101	-		115 (252.8)	134.0 (295.2)	-
104	-	-	-	63.6 (140)	-
112	-	-	11.2 (24.7	-	-
111G Cresylic	-	-	35.9 (79.0)	-	-
116	-	-	1210 (2665)	1325 (2910)	895 (1970)
122	-	-	965 (2123)	1063.7 (2343)	-
123	325.5 (716.9) - 1968	-	-	-	-
124	-	-	289.7 (638.2)	-	-
125	-	-	965 (2123)	1068 (2352)	805 (1773)
133	-	63.4 (139.7)	30 (66)	-	-
134	-	-	28.5 (62.7)	-	-
135	-	-	222 (488.8)	233.8 (515)	-
142	-	-	48.3 (106.2)	50.4 (111)	-
143	-	5 (11.1)	-	-	-
144	-	-	122.0 (268.7)	140.5 (329.1)	-
148	-	-	11.5 (25.3)	-	-
150	-	-	12.6 (27.8)	-	-
154	-	-	6.2 (13.7)	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number(a)	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
160	-	-	55.2 (121.5)	-	-
161	-	-	7.1 (15.7)	-	-
172G	-	-	-	237.6 (522.8)	-
176	-	-	7.4 (16.2)	-	-
178	-	-	15.7 (34.7)	-	-
181	-	-	24.2 (53.3)	-	-
185	-	-	229 (503)	-	-
187	-	-	890 (1961.8)	862.6 (1900)	-
188	-	-	141 (310)		-
189	-	-	100.5 (221.5)	89.1 (196)	-
191	-	-	125.1 (275.5)		-
192	-	25.2 (55.5)	-	-	-
193	-	-	2580 (5688)	139 (305)	-
195	-	-	2.9 (6.5)	-	-
196	-	-	299.7 (660.1)	-	-
199	-	-	-	10,859 (23,890)	-
202	-	-	-	30 (66)	-
203	-	-	150.3 (331.1)	-	-
204	-	-	4210 (9292.7)	3496.3 (7701)	2700 (5940)
205	-	-	1485 (3277.6)	1518 (3340)	1727 (3800)
206	-	-	2.8 (6.1)	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number(a)	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
211	-	-	62.4 (137.8)	-	-
213	-	-	86.5 (190.3)	72.2 (159.0)	-
216	-	-	39.1 (86.2)	-	-
221	-	-	1890 (4167)	1765 (3888)	-
222	-	-	32.8 (72.4)	27.2 (60)	-
223	-	-	182.5 (402.3)	-	-
227	-	-	2918 (6424.1)	2654.0 (5845.8)	-
229	-	-	24.2 (53.1)	-	-
230	-	-	24.3 (53.5)	19.1 (42)	-
232	-	-	94.4 (208) (synthetic only)	161.8 (356.3)	-
236	204 (450) - 1967	-		-	-
239	-	-	45.7 (100.7)	-	-
241	-	-	45.7 (100.7)	-	-
242	-	-	10.9 (23.9)	-	-
243	-	-	138.1 (304.3)	-	-
244	-	-	8.1 (17.9)	-	-
248	-	-	60.2 (132.8)	-	-
249	-	5.3 (11.75)	-	-	-
250	-	-	-	173.6 (381.9)	-
253	-	-	79.2 (174.3)	81.7 (180)	-

(Continued)

TABLE E-11. (Continued)

Compound Number$^{(a)}$	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
254	55.4 (112) - 1967	-	22.4 (49.3)	-	-
256	-	-	-	53.6 (118)	-
257	151.8 (334.3) - 1971	-	-	-	-
259	-	-	833 (1835)	869.1 (1914.4)	-
265	-	-	128 (282)	132 (290)	-
268	30.9 (68) - 1968	-	-	-	-
269	-	-	321 (706)	-	-
275	-	-	3210 (7064.4)	3126 (6878)	-
276	-	-	16.8 (37.0)	24.9 (54.7)	-
279	-	-	247 (544.1)	207.3 (456.7)	-
284	-	-	236 (520.2)	264.1 (581.7)	-
285	-	-	-	-	91 (200)
286	-	-	246 (540.7)	230 (506)	-
288	-	-	15.9 (35)	-	-
289	-	-	70.3 (154.8)	94 (207)	-
292	-	-	23.8 (52.5)	26 (57)	-
293	-	-	228 (501.8)	-	-
295	-	-	164 (360)	-	-
299	10.8 (23.8) - 1955	-	-	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number(a)	Total Production, millions of kg (millions of pounds) Earlier Years	1972	1973	1974	1975
302	-	-	140.1 (308.7)	-	-
316	-	-	49 (108)	-	-
322	-	-	46.8 (103.2)	57 (125)	45.2 (99.6)
327	-	-	321 (706)	334 (734)	306 (674)
331	-	-	1019 (2241)	1045 (2298)	783 (1722)
334G	29.1 (64) - 1971	-	-	-	-
337	-	-	330.6 (728.2)	394 (867)	-
338	-	-	465 (1023)	444 (977)	322 (709)
343	104.4 (230 - 1967	-	-	84 (184)	-
344	-	-	25.8 (56.9)	44 (97)	-
346	-	-	38.8 (85.5)	-	-
347	21,802 (48,022) - 1971	-	-	-	-
349	-	-	27.4 (60.4)	40 (87)	-
350	-	-	42.1 (92.6)	44 (26)	-
351	-	7.6 (16.7)	0.20 (0.44)	1.6 (3.6)	-
353	-	-	4493 (9884)	4761 (10,475)	3454 (7598)
356	-	-	797 (1753)	798 (1756)	692 (1523)
357	3.4 (7.4) - 1968	-	-	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number(a)	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
358	11.8 (26) - 1970	-	-	-	-
360	6.2 (13.6) - 1969	-	18.9 (41.5)	20 (44)	-
362	-	-	5.4 (11.8)	-	-
363	29.5 (64.9) - 1970	-	31.1 (68.5)	-	-
365	-	-	17.5 (38.6)	-	-
368	-	-	2716 (5975)	2708 (5956)	1999 (4398)
374 (TPA)	-	-	-	1936 (4260)	2114 (4650)
374 (DMT)	-	-	-	1483 (3262)	-
377	-	-	160.4 (353.3)	211 (464)	-
382	-	-	87.6 (193)	-	-
390	-	-	13 (28)	-	-
391	170.1 (374.6) - 1971	-	-	193.0 (425.1)	-
392	-	-	205 (451.7)	176 (388)	-
393	-	-	152 (334)	156.2 (344)	-
396	-	-	44.8 (98.5)	49 (108)	-
397	-	-	-	13 (29)	-
398	-	-	51.3 (113.1)	50 (110)	-
401	-	-	13.1 (28.9)	-	-

(Continued)

TABLE E-11. (Continued)

Compound Number[a]	Total Production, millions of kg (millions of pounds)				
	Earlier Years	1972	1973	1974	1975
402	-	-	3305 (7271)	3447 (7583)	3359 (7390)
403	-	-	683 (1503)	638 (1403)	516 (1136)
404	-	-	2432 (5351)	2555 (5621)	1907 (4196)
405	-	-	-	77.2 (170)	-
407G	-	-	-	2627 (5780)	2309 (5080)
408	-	-	485 (1068)	480 (1056)	308 (679)
409	-	-	1057 (2326)	1230 (2707)	1102 (2425)

(a) Item number of compound in Industrial Organic Chemicals table.

TABLE E-12. TOTAL PRODUCTION - INDUSTRIAL ORGANIC CHEMICALS

[LISTED ACCORDING TO INCREASING PRODUCTION FOR 1973]

Total Production, MM kg (MM pounds)	Compound Number[a]	Total Production, MM kg (MM pounds)	Compound Number[a]
0.20 (0.44)	351	30 (66)	133
0.33 (0.74)	47	31.1 (68.5)	363
0.9 (2.0)	33	32.8 (72.4)	222
1.0 (2.2)	12	36.8 (81.0)	67
1.8 (4.0)	6	38.8 (85.5)	346
1.82 (4.0)	73	39.1 (86.2)	216
2.8 (6.1)	206	40.2 (88.4)	188
2.9 (6.5)	195	42.1 (92.6)	350
5.35 (11.8)	362	44.8 (98.5)	396
5.45 (12.0)	24	45.7 (100.7)	239
5.9 (12.9)	51	45.7 (100.7)	241
6.2 (13.7)	154	46.8 (103.2)	322
7.1 (15.7)	161	48.3 (106.2)	142
7.4 (16.2)	176	49 (108)	316
8.1 (17.9)	244	51.3 (113.1)	398
10.9 (23.9)	242	55.2 (121.5)	160
11.2 (24.7)	112	58.1 (128)	70
11.5 (25.3)	148	59.7 (131.6)	16
12.6 (27.8)	150	60.2 (132.8)	248
13.1 (28.9)	401	62.4 (137.8)	211
15.7 (34.7)	178	70.3 (154.8)	289
15.9 (35)	288	79.2 (174.3)	253
16.8 (37.0)	276	81.7 (180)	185
17.5 (38.6)	365	86.5 (190.3)	213
18.2 (40)	15	87.6 (193)	382
18.9 (41.5)	360	94.4 (208) (synthetic only)	232
22.4 (49.3)	254		
23.8 (52.5)	292	100.5 (221.5)	189

(Continued)

TABLE E-12. (Continued)

Total Production, MM kg (MM pounds)	Compound Number[(a)]	Total Production, MM kg (MM pounds)	Compound Number[(a)]
24.1 (53.1)	229	115 (252.8)	101
24.2 (53.3)	181	122.0 (268.7)	144
24.3 (53.5)	230	125.1 (275.5)	191
25.8 (56.9)	344	127.8 (281.8)	265
26.1 (57.5)	111G	138.1 (304.3)	243
27.4 (60.4)	349	140.1 (308.7)	302
28.5 (62.7)	134	145.1 (319.7)	57
150.3 (331.1)	203	614.8 (1354.2)	17
152 (334)	393	683 (1503)	403
160.4 (353.3)	377	711 (1567)	18
180.5 (397.5)	94	758.2 (1670)	8
182.5 (402.3)	223	797 (1753)	356
205 (451.7)	392	833 (1835)	259
205.6 (453)	71	890 (1961.8)	187
207.8 (457.6)	30	904 (1989)	9
216 (477)	80	965 (2123)	122
222 (488.8)	135	965 (2123)	125
228 (501.8)	293	1019 (2241)	331
235.5 (518.6)	62	1057 (2326)	409
236 (520.2)	284	1104 (2429)	7
246 (540.7)	286	1210 (2665)	116
247 (544.1)	279	1485 (3277.6)	205
272.6 (600.5)	295	1890 (4167)	221
289.7 (638.2)	124	2432 (5351)	404
299.7 (660.1)	196	2580 (5688)	193
321 (706)	327	2716 (5975)	368
330.6 (728.2)	337	2918 (6424.1)	227
352.9 (777.4)	84	3210 (7064.4)	275
378.9 (834.5)	88	3305 (7271)	402
465 (1023)	338	4210 (9292.7)	204

(Continued)

TABLE E-12. (Continued)

Total Production, MM kg (MM pounds)	Compound Number[a]	Total Production, MM kg (MM pounds)	Compound Number[a]
476 (1047)	86	4493 (9884)	353
485 (1068)	408	5130 (11,300)	36
508.5 (1120)	72		

(a) Item number of compound in Industrial Organic Chemicals table.

TABLE E-13. INDUSTRIAL ORGANIC CHEMICAL HUMAN AND ANIMAL TOXICITY AND CARCINOGEN DATA ADDED DURING 1979 REVISION(a)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
2	LDLo:500 mg/kg, orl	--	--
6	--	LDLo:500 mg/kg, orl-dog	--
9	LDLo:50 mg/kg, orl 3a)7 This value is incorrect, data should be 500 mg/kg	--	--
14	LDLo:5 mg/kg, orl	LCLo:8 ppm/4H ihl-rat	--
17	--	--	Human carcinogen TCLo:80 ppm/GH/52W TFX:NEO, ihl-rat TDLo:1700 mg/kg/37WC TFX:NEO, orl-rat
18	--	LD50:275 mg/kg, ipr-rat	--
19	LDLo:50 mg/kg, orl	LC50:165 ppm/4H ihl-rat	--
20	LCLo:3000 ppm, ihl	--	--
22	LDLo:500 mg/kg, orl	--	--
24	TCLo:5000 mg/m^3/30M, ihl	--	--
26	LDLo:500 mg/kg, orl	--	--
30	LDLo:350 mg/kg, orl	LD50:64 mg/kg, ivn-rbt LC50:250 ppm ihl-rat	--
37	LDLo:500 mg/kg, orl	LD50:9 mg/kg, ipr-mus LD50:28 mg/kg, orl-mus	--
39	--	--	Human leukemogen TCLo:2100 mg/m^3/44I TFX:CAR, ihl-man
44	LDLo:500 mg/kg, orl	--	--
45	LDLo:500 mg/kg, orl	--	--
48	LDLo:40 mg/kg, orl	--	--

(Continued)

TABLE E-13. (Continued)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
50	TCLo:2 ppm/1M, ihl	--	--
51	LDLo:500 mg/kg, orl	--	--
53	LD50:500 mg/kg, orl	--	--
54	--	LC50:150 ppm/2H ihl-rat	--
65	LDLo:500 mg/kg, orl	--	--
70	LDLo:500 mg/kg, orl	--	--
74	--	LD50:225 mg/kg, orl-dog	--
84	LDLo:14 mg/kg, orl	--	--
86	LDLo:43 mg/kg, orl	TCLo:300 ppm/(6-15D preg) TFX:TER, ihl-rat LDLo:125 mg/kg, ivn-dog	
88	LDLo:500 mg/kg, orl	--	TDLo:71 gm/kg/78W TFX:CAR, orl-mus
89	LDLo:50 mg/kg, orl	--	TDLo:100 mg/kg TFX:NEO, scu-mus
90	--	LDLo:222 mg/kg, skn-cat	--
92	--	LD50:223 mg/kg, skn-cat	--
101	LDLo:40 mg/kg, orl	TCLo:100 ppm/7H/(6-15D preg) TFX:TER, ihl-rat	TDLo:70 gm/kg/78WI TFX:NEO, orl-rat
104	TCLo:0.012 mg/m^3, ihl (ortho)	LD50:135 mg/kg orl-mus (ortho)	--
105	--	--	TDLo:6 gm/kg/15WI, TFX:NEO
111	LDLo:50 mg/kg, orl	--	--
115	--	LD50:100 mg/kg, ipr-rat	--
119	TCLo:10 mg/m^3, ihl	--	--

(Continued)

TABLE E-13. (Continued)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
120	--	--	TDLo:55 gm/kg/82WI TFX:NEO, orl-rat TDLo:27 gm/kg/2YI TFX:NEO, scu-rat
122	LDLo:500 mg/kg, orl	--	--
126	LDLo:50 mg/kg, orl	--	--
127	TCLo:100 ppm, ihl	--	--
128	--	--	TDLo:12 gm/kg/52WI TFX:CAR, skn-mus
129	TCLo:100 ppm, ihl	--	--
133	LDLo:500 mg/kg, orl	--	--
141	LDLo:50 mg/kg, orl	LD50:135 mg/kg, scu-mus	--
144	LDLo:1000 mg/kg, orl	LCLo:130 mg/m^3 ihl-mus	--
148	LDLo:500 mg/kg, orl	--	--
150	LDLo:500 mg/kg, orl	--	--
151	LDLo:500 mg/kg, orl	--	--
161	LDLo:50 mg/kg, orl	--	--
163	LDLo:500 mg/kg, orl	--	--
164	LCLo:97 ppm/10M, ihl	--	--
167	TDLo:4 mg/kg/2DI TFX:BLD, skn	LDLo:27 mg/kg, orl-cat	--
169	--	LD50:29 mg/kg, orl-cat	--
176	LDLo:500 mg/kg, orl	--	--
178	LDLo:500 mg/kg, orl	LD50:300 mg/kg, orl-gpg	--
185	LDLo:50 mg/kg, orl	--	--
187	TDLo:1.43 mg/kg, orl	TDLo:7500 mg/kg (9D preg) TFX:TER	--
189	TCLo:400 ppm-IRR, ihl	--	--
191	TCLo:50 ppm-IRR, ihl	--	--

(Continued)

TABLE E-13. (Continued)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
193	TCLo:100 ppm/4H IRR, ihl	--	--
200	--	LDLo:500 mg/kg, ipr-mus	--
201	LDLo:50 mg/kg, orl LCLo:300 ppm/2H, ihl	LD52:385 mg/m^3, ihl-mus	--
203	LDLo:50 mg/kg, orl	--	TDLo:400 mg/kg/10WI TFX:CAR, orl-rat TDLo:18 gm/kg/42WI TFX:CAR, orl-mus
204	LDLo:500 mg/kg, orl	Experimental mutagen and teratogen 3)658	Experimental carcinogen 3)658
206	LDLo:500 mg/kg, orl	--	--
211	LDLo:50 mg/kg, orl	--	--
213	LDLo:500 mg/kg, orl	--	--
217	LDLo:500 mg/kg, orl	--	--
219	LDLo:50 mg/kg, orl	--	--
222	LDLo:420 mg/kg, orl	--	--
227	LDLo:500 mg/kg, orl	--	--
238	LDLo:50 mg/kg, orl	--	--
241	LDLo:500 mg/kg, orl	LD50:200 mg/kg, scu-rat	--
242	LDLo:500 mg/kg, orl	--	--
243	LDLo:0.57 mg/kg, orl	--	--
244	LDLo:29 mg/kg, orl	--	--
245	LDLo:50 mg/kg, orl	--	TDLo:27 gm/kg/I TFX:CAR, orl-rat TDLo:3.8 gm/kg/I TFX:CAR, scu-rat
248	LDLo:500 mg/kg, orl	--	TDLo:29 gm/kg/I TFX:CAR, orl-rat TDLo:9 gm/kg/I TFX:CAR, scu-rat
255	TCLo:25 ppm-IRR, ihl	--	--

(Continued)

TABLE E-13. (Continued

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
258	TDLo:200 ppm-EYE, ihl	--	--
267	TCLo:25 ppm-IRR, ihl	--	--
280	LDLo:500 mg/kg, orl	--	--
281	TCLo:500 ppm-IRR, ihl	--	--
282	--	LD50:200 mg/kg, ipr-mus	--
284	LDLo:500 mg/kg, orl	--	--
285	TDLo:8.42 mg/kg, orl	--	--
286	LDLo:500 mg/kg, orl	TCLo:1000 ppm/(6-15D preg) TFX:TER, ihl-rat	--
287	LDLo:500 mg/kg, orl	--	--
288	TCLo:50 ppm-IRR, ihl	--	--
289	LDLo:500 mg/kg, orl	--	--
290	LDLo:500 mg/kg, orl	--	--
295	LDLo:50 mg/kg, orl	--	--
298	LDLo:50 mg/kg, orl	--	--
299	LDLo:50 mg/kg, orl	--	--
302	LDLo:5 mg/kg, orl	--	--
307	LDLo:500 mg/kg, orl	--	--
310	LDLo:500 mg/kg, orl	--	--
320	TDLo:14 mg/kg-PSY, orl	--	--
327	LDLo:500 mg/kg, orl	--	--
335	LDLo:50 mg/kg, orl	--	--
336	LDLo:50 mg/kg, orl	--	--
337	LC50:3200 mg/m^3, ihl	--	--
340	LDLo:50 mg/kg, orl	--	TDLo:1.7 gm/kg/145DI TFX:CAR, scu-rat TDLo:101 gm/kg/461DI TFX:NEO, orl-rat (plus 2 other data sets)
342	LDLo:5000 mg/kg, orl	--	--
246	LDLo:500 mg/kg, orl	--	--

(Continued)

TABLE E-13. (Continued)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
350	LDLo:500 mg/kg, orl	--	--
355	LDLo:50 mg/kg, orl	--	--
358	LDLo:29 mg/kg, orl	--	TDLo:4800 mg/kg/12WI TFX:NEO, skn-mus
360	LDLo:50 mg/kg, orl	--	--
368	LDLo:500 mg/kg, orl	--	--
375	LDLo:50 mg/kg, orl	--	--
380	--	LDLo:80 mg/kg, ivn-rbt	--
382	LDLo:50 mg/kg, orl	--	--
388	LDLo:50 mg/kg, orl	--	--
391	LDLo:50 mg/kg, orl	--	--
392	LDLo:50 mg/kg, orl	--	--
396	LDLo:5000 mg/kg, orl	--	--
398	LDLo:5000 mg/kg, orl	--	--
405	TCLo:25 ppm-SYS, ihl	--	Experimental carcinogen 3)1088
410	LDLo:50 mg/kg, orl	--	--
415	LDLo:50 mg/kg, orl	--	--
1ADD	TCLo:2 ppm/1M-IRR	--	--
3ADD	LDLo:50 mg/kg, orl	--	--
4ADD	--	--	TDLo:4100 mg/kg/12WI TFX:NEO
6ADD	LDLo:500 mg/kg, orl	--	--
11ADD	--	--	Experimental carcinogen 3)453
14ADD	--	--	Polycaprolactam TDLo:5 film discs/rat TFX:NEO, imp-rat
23ADD	--	--	Experimental carcinogen
33ADD	LDLo:5 mg/kg, orl	--	--
38ADD	LDLo:5 mg/kg, orl	--	--
40ADD	LDLo:500 mg/kg, orl	--	--

(Continued)

TABLE E-13. (Continued)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
42ADD	LDLo:500 mg/kg, orl	TDLo:500 mg/kg (7-11D preg) TFX:TER, orl-mus	--
45ADD	--	--	TCLo:400 ppb/35WI TFX:CAR, ihl-rat
48ADD	LDLo:500 mg/kg, orl	--	TDLo:410 mg/kg/26WC TFX:CAR, orl-mus
54ADD	LDLo:50 mg/kg, orl	--	--
55ADD	--	--	TDLo:38 gm/kg/63WI TFX:NEO, skn-mus TDLo:330 mg/kg/82W TFX:NEO, scu-mus
59ADD	TCLo:75 ppm-IRR, ihl	--	--
61ADD	LDLo:50 mg/kg, orl	--	--
64ADD	LDLo:5000 mg/kg, orl	--	--
66ADD	LDLo:0.071 mg/kg, orl 2)609	--	--
65ADD	--	TDLo:500 mg/kg (D preg) TFX:TER, scu-rat	--
68ADD	LDLo:50 mg/kg, orl	--	--
70ADD	--	LD50:320 mg/kg, skn-rbt	--
77ADD	LDLo:500 mg/kg, orl	--	--
80ADD	LDLo:50 mg/kg, orl	--	--
81ADD	TCLo:0.02 ppm/2Y/PUL	--	--
82ADD	LDLo:500 mg/kg/orl	--	--
83ADD	LDLo:500 mg/kg, orl	--	TDLo:29 gm/kg/78WI TFX:CAR
84ADD	LDLo:1000 mg/kg, orl	--	--
88ADD	LDLo:50 mg/kg, orl	--	--
90ADD	LDLo:50 mg/kg, orl	--	--

(a) All new human toxicity data are included, with much of the data from reference 39, as cited in reference 2, 1977 edition. Animal data includes all new teratogenic or mutagenic data, all new LD50 or LDLo data $\leq$ 500 mg/kg and all new LC50 or LCLo data $\leq$ 1000 ppm or 200 mg/m^3, except new LD50: orl-rat data. These are in Table E-6 only. Carcinogenic data includes all new entries.

APPENDIX F

EPA PRIORITY LISTS

TABLE F-1. EFFLUENT GUIDELINES PRIORITY LIST (IOC - Phase 1)[(a)]

Compound	IOC Item Number[(b)]
Acetaldehyde (3 process)	3
Acetic acid	7
Acetone (2 processes)	9
Acetylene	13
Acrylates	191, 68, 39ADD, 59ADD, 71ADD
Acrylic acid	16
Aniline	30
Bisphenol A	57
BTX Aromatics (2 processes)	39, 30DP-R, 407G
Butadiene (2 processes)	60
Caprolactam	14ADD
Coal tar (2 processes)	--
p-Cresol	113
Cyclohexane	122
Dimethyl terephthalate	374
Ethyl benzene	193
Ethylene	199
Ethylene dichloride	204
Ethylene glycol	205
Formaldehyde	227
Methanol	275
Methyl amines	276, 160, 401
Methyl methacrylate	64ADD
Oxo Chemicals	70, 80, 128, 223, 248, 250, 254
Phenol	331
Propylene	353
Styrene	368
Terephthalic acid (3 processes)	374
Tetraethyl lead	377
Vinyl chloride (2 processes)	404
Vinyl acetate	403

(a) Taken from reference 18.

(b) ADD in Table A-2, IOC Addendum/ DP-R in Table B-1, ODP raw materials.

TABLE F-2. EFFLUENT GUIDELINES PRIORITY LIST (IOC - Phase 2)[a]

Compound	IOC Item Number[b]
Acrylonitrile	17
Sec-Butyl alcohol	71
Chlorinated methanes	279, 284, 101, 86
Cresol, synthetic	111G
Citric acid	--
Cumene	116
Dyes and dye intermediates	ODP
Hexamethylene diamine	43ADD
Hexamethylene tetramine	241
Isobutylene	64
Isopropanol	259
Maleic anhydride	265
Methyl ethyl ketone	286
Monosodium glutamate	--
Pentaerythritol	322
Perchloroethylene	327
Propylene oxide	356
Plasticizers	--
p-Xylene	409

(a) Taken from Reference 18.

(b) 43ADD found in Table A-2, IOC Addendum.

TABLE F-3. WATER QUALITY PLANNING AND STANDARDS CONSENT DECREE LIST$^{(a)}$

Compound	Appendix Item Number$^{(b)}$ IOC	DP-I
Acenaphthane	1	--
Acrolein	14	--
Acrylonitrile	17	--
Benzene	39	--
Benzidine	5ADD	--
Carbon tetrachloride	86	--
Chlorinated benzenes	(General class - other than dichlorobenzenes)	
Chlorobenzene	94DP	--
Trichlorobenzenes (isomers)	390G	--
(1,2,4-Trichlorobenzene)	390	--
Chlorinated ethanes	(General class - specified compounds follow)	
1,2-Dichloroethane	204	--
1,1,1-Trichloroethane	82ADD	--
Hexachloroethane	238	--
Chloroalkyl ethers	(General class - specific compounds follow)	
Chloromethyl ether (Dichloromethyl ether)	--	--
Chloroethyl ether (Dichloroethyl ether)	137	--
Mixed ethers		
Chlorinated naphthalene	(General class - specific compounds follow)	
1-Chloronaphthalene	102	--
2-Chloronaphthalene	103	--
Chlorinated phenols	(General class - other than those listed elsewhere, includes trichlorophenols and chlorinated cresols)	
Trichlorophenols (isomers)	83ADD	--
Chlorinated cresols (isomers)	--	--
Chloroform	101	--
2-Chlorophenol$^{(b)}$	106DP	--
Cyanides		
Hydrogen cyanide	243	--
Acetone cyanohydrin (2-Methyl lactonitrile)	10	--

(Continued)

TABLE F-3. (Continued)

Compound	Appendix Item Number(b) IOC	DP-I
Dichlorobenzenes (General class)	133G	--
2,3-Dichlorobenzene	133DP	--
1,3-Dichlorobenzene	25ADD	281
1,4-Dichlorobenzene	134DP	--
Dichlorobenzidine	--	434
Dichloroethylenes (General class)		
1,1-Dichloroethylene(c)	405	--
1,2-Dichloroethylene	136	--
2,4-Dichlorophenol	27ADD	--
Dichloropropane (General class)		
1,2-Dichloropropane	355	--
Dichloropropene (General class)		
1,2-Dichloropropene	140	--
2,4-Dimethylphenol(d)	410	--
Dinitrotoluene (Isomers below)	172G	--
2,3-Dinitrotoluene	172	--
2,4-Dinitrotoluene	173	--
2,5-Dinitrotoluene	174	--
2,6-Dinitrotoluene	175	--
Diphenylhydrazine	35ADD	--
Ethyl benzene	193	--
Fluoranthene	--	--
Haloethers	(Genral class - other than those listed elsewhere)	
Chlorophenylphenyl ether	--	--
Bromophenylphenyl ether	--	--
Bis(dichloroisopropyl) ether	--	--
Polychlorinated diphenyl ether (isomers)	--	--
Halomethanes	(General class - other than those listed elsewhere)	
Methylene chloride	284	--
Methyl chloride	279	--

(Continued)

TABLE F-3. (Continued)

	Appendix Item Number[b]	
Compound	IOC	DP-I
Methyl bromide	61ADD	--
Bromoform	--	--
Dichlorobromomethane	--	--
Trichlorofluoromethane	393	--
Dichlorodifluoromethane	255	--
Hexachlorobutadiene	--	--
Hexachlorocyclohexane	--	--
Hexachlorocyclopentadiene	--	--
Naphthalene	295DP	--
Nitrobenzene	(General - specific compounds follow)	
2,4-Dinitrophenol	33ADD	--
Pentachlorophenol	--	--
Phenol	331DP	--
Tetrachloroethylene	--	--
Toluene	30[c]	--
Trichloroethylene	392	--
Vinyl chloride	404	--

(a) Inorganics and organic insecticides and herbicides deleted from published decree as not pertinent. The chemicals listed are to be covered by the Effluent Guidelines Standards for Best Available Technology Economically Achievable by June 30, 1983.

(b) ADD refers to compounds in Table A-3, IOC Addendum, DP-I to compounds in Table B-2.

(c) Table B-1.

TABLE F-4. POTENTIALLY SIGNIFICANT AIR TOXICANTS FROM THE OFFICE OF AIR QUALITY PLANNING AND STANDARDS (AQPS)

Compound	IOC Number
Acetaldehyde	3
Acetonitrile	11
Acrolein	14
Acrylonitrile	17DP(a)
Allyl chloride	20
Aniline	30DP
Benzene	39
Carbon tetrachloride	86
Chloroform	101
Chloroprene	18ADD(b)
Di(2-ethyl hexyl phthalate)	--
Dimethylamine	160DP
Dioxane	176
Ethylene dibromide	203
Ethylene oxide	221DP
Formaldehyde	227DP
Hydrogen cyanide	243
Maleic anhydride	265
Nitrobenzene	302DP
Perchloroethylene	327
Trichloroethylene	392
Vinylidine chloride	405

(a) Table B-1.

(b) Table A-3, IOC Addendum.

TABLE F-5. THIS STUDY "PRIORITY" LIST IOC DISTRIBUTION ON EPA PRIORITY LISTS[a,b]

IOC Item No.	Effluent Guidelines Priority List - Phase 1 (Table F-1)	Effluent Guidelines Priority List - Phase 2 (Table F-2)	WQPS Consent Decree List (Table F-3)	OAQPS Priority List (Table F-4)
1	--	--	X	--
3	X	--	--	X
10	--	--	2X	--
14	--	--	--	2X
16	X	--	--	--
17	--	3X	3X	3X
20	--	--	--	2X
30	3X	--	--	3X
39	2X	--	2X	2X
70	X	--	--	--
71	--	X	--	--
86	--	3X	3X	3X
101	--	2X	2X	2X
111	--	X	--	--
113	X	--	--	--
133	--	--	2X	--
134	--	--	2X	--
135	--	--	--	--
137	--	--	3X	--
140	--	--	2X	--
160	--	--	--	X
173	--	--	X	--
175	--	--	X	--
176	--	--	--	3X
203	--	--	--	2X
204	2X	--	--	--
205	2X	--	--	--
221	--	--	--	3X
227	3X	--	--	3X
241	--	2X	--	--
243	--	--	2X	2X
259	--	2X	--	--
265	--	3X	--	2X
275	3X	--	--	--
284	--	X	X	--
295	--	--	2X	--
302	--	--	2X	--
327	--	X	--	--
331	4X	--	4X	--

(Continued)

TABLE F-5. (Continued)

IOC Item No.	Effluent Guidelines Priority List - Phase 1 (Table F-1)	Effluent Guidelines Priority List - Phase 2 (Table F-2)	WQPS Consent Decree List (Table F-3)	OAQPS Priority List (Table F-4)
356	--	2X	--	--
368	2X	--	--	--
377	X	--	--	--
403	X	--	--	--
404	--	--	2X	--
405	--	--	2X	--
410	--	--	X	--

(a) Eight (8) "priority" lists from the present study are included (Tables E-4 through E-10).

(b) X means commonality of entrants on one table from the group Table E-4 through Table E-10, 2X and 3X indicate occurrence on two or three of these tables.

TABLE F-6. LIST OF POTENTIALLY HAZARDOUS WASTE MATERIALS(a)

IOC Item No.	User's SIC No.(b)	Production MM, lbs
3	--	1,652
7	20,38	1,770
8DP	20,26,36	1,675
9DP	38	1,589
10	--	970
11	--	150
1ADD	20 20	<10
13	34 34	468
Acridine	--	<10
14	19	<10
16	22,26,31	150
17DP	22,30	1,037
19	19	10
20	--	10
24 (Banana Oil)	20,22,39	10
25 (Fusel Oil)	22,38	64
30	30,38	372
Anthracenes	--	100
39	--	8,000
42 ADD	--	800
41DP	--	10
44DP	38	55
54DP	--	88
60	30	3,054
61	29	2,160
62DP	--	404
64	--	1,630
67	22,26	127
70	30	63
73DP	--	11
Butyl mercaptan	--	10
78DP	--	10
80	--	10
84	--	1,640
86	--	935
337	--	447
Chloral hydrate	--	10
Chloroacetophenone	29	10
94DP	--	700
101	--	239

(Continued)

TABLE F-6. (Continued)

IOC Item No.	User's SIC No.(b)	Production MM, lbs
18ADD	--	154
111G	20,33	245
114	20	<10
116	--	1,500
128	--	<10
122	--	280
123DP	--	716
124DP	--	704
126DP	30	72
128	--	162
Dibutyl phthalate	--	29
133DP	--	75
134DP	--	72
137	--	--
284	--	418
355	--	86
140	--	--
142DP	--	92
143DP	29,30	7
222	--	102
176	--	--
28ADD	--	--
158	--	32
Diisobutylketone	--	--
160DP	--	74
181	--	45
37ADD	--	533
185	20	120
186	--	--
187DP	20	320
188DP	22,29	265
189	--	159
191	22,26,31	167
192DP	20	16
193	--	4,700
196DP	--	600
199	--	15,600
203DP	29	--
Ethylene cyanohydrin	--	--
202	--	65

(Continued)

TABLE F-6. (Continued)

IOC Item No.	User's SIC No.(b)	Production MM, lbs
Dibromoethane	--	--
204	--	6,700
205DP	--	2,400
213	--	--
212	--	--
221DP	--	3,671
28ADD	22,26,34	1.5
223	--	440
Ethyl mercaptan	--	--
286	--	--
Ethyl phthalate	--	--
2-Ethyl-3-propylacrolein	--	--
227DP	20,22,39,73	4,312 (37%)
229DP	22,31	40
40ADD	--	380
Furfural alcohol	--	22
Heptane	--	244
43ADD	34	--
Hexane	--	232
243	33,34	410
244DP	34	12
249	34	--
248DP	--	--
255	--	--
257	30	300
259	--	2,000
258	--	44
260DP	--	20
53ADD	22	12
267	--	--
275	29	9,245
273	--	9
59ADD	31	--
276DP	30	120 (30%)
61ADD	--	21
279	30	432
Methyl chloroformate	--	--
287	26	--
289	--	--
Methyl mercaptan	29	--

(Continued)

TABLE F-6. (Continued)

IOC Item No.	User's SIC No.(b)	Production MM, lbs
64ADD	29	430
277	--	--
294DP	30,34	21
295DP	31,34	700
96 and 980DP-I(c)	--	10
302DP	--	515
278, 279, and 2800DP-I(c)	30	100
306	--	--
307	29	--
309	34	50
310	--	--
311	--	--
313	19,34	18
65ADD	22,31	23
67ADD	--	--
Pentachlorophenol	22,24,26	47
323	38	--
327	22	706
331DP	--	1,680
374DP	--	760
347	29	7,200
348	30,32	--
349	--	40
n-Propylacetate	20	21
350	--	68
351	29	0.2
353	--	7,240
293	--	450
356	--	1,121
355	20	--
357DP	30	7
48	34	--
360DP	30	44
365DP	--	--
Sodium oxalate	--	--
368	26	4,400
375DP	--	--
377	--	371
81ADD	--	--
Tetramethyllead	--	76

(Continued)

TABLE F-6. (Continued)

IOC Item No.	User's SIC No.(b)	Production MM, lbs
82ADD	29	--
387	22	9
390DP	--	15
391	22,33,34	340
392	--	239
396	32	77
397	--	--
399	29	80
88ADD	--	--
401	--	20
85ADD	29,35	48
403	--	799
404	30,44	4,040
407DP	--	--

(a) Reference 18.

(b) End use patterns for the chemical, classified by standard industrial classification numbers, as shown below.

(c) Table B-2, organic dyes and pigments - intermediates.

(d) Table B-1. organic dyes and pigments - other materials.

TABLE F-7. SPILLS LIST OF POTENTIALLY HAZARDOUS SUBSTANCES[a]

Compound	EPA Toxicological Criteria[b]	Appendix Table Item Numbers[c]		
		IOC	DP-R	DP-I
Acetaldehyde	1	3	--	--
Acetic acid	1	7	--	--
Acetic anhydride	1	8	--	--
Acetone cyanohydrin	2	10	--	--
Acetyl bromide	1	--	--	--
Acetyl chloride	1	1ADD	--	--
Acrolein	1,2	14	--	--
Acrylonitrile	1	17	--	--
Adiponitrile	1	2ADD	--	--
Allyl alcohol	1	19	--	--
Allyl chloride	1	20	--	--
Benzene	1	39	--	--
Benzoic acid	1	44DP	--	--
Benzonitrile	1,3	46	--	--
Benzoyl chloride	1	50DP	--	--
Benzyl chloride	1	54DP	--	--
Butyl acetate	1,2	65[d]	--	--
		66[f]	--	--
		67[g]	--	--
Butylamine	1	73[d]	--	--
		74[f]	--	--
		75[g]	--	--
Butyric acid	1	81	--	--
Carbon disulfide	1	84	--	--
Chlorobenzene	1	94DP	--	--
Chloroform	1	101	--	--
Chlorosulfonic acid	1	8ADD	--	--
Cresol	1	111G[h]	--	--
		111[i]	--	--
		112[j]	--	--
		113[k]	--	--

(Continued)

TABLE F-7. (Continued)

Compound	EPA Toxicological Criteria(b)	Appendix Table Item Numbers(c)		
		IOC	DP-R	DP-I
Hydrogen cyanide	1,2	243	--	--
Cyclohexane	1	122	--	--
2,6-Dichlorobenzonitrile	1	--	--	--
Diethylamine	1	143DP	--	--
Dimethylamine	1	--	11	--
Dinitrobenzene	1	167G	--	291
		167(i)	--	--
		168(k)	--	--
		169(j)	--	--
Dinitrophenol	1,2	--	--	--
Dodecylbenzenesulfonic acid	1	--	--	--
Ethyl benzene	1	193	--	--
Ethylenediamine	1	202	--	--
Ethylenediaminotetraacetic acid (EDTA)	1	--	--	--
Formaldehyde	1	227DP	--	--
Formic acid	1	229DP	--	--
Fumaric acid	1	230	--	--
Furfural	1	--	--	--
Isoprene	1	257	--	--
Maleic acid	1	264	--	--
Maleic anhydride	1	265	--	--
Methyl mercaptan	1	--	23	--
Methyl methacrylate	1	64ADD	--	--
Monoethylamine (ethylamine)	1	192DP	--	--
Monomethylamine	1	276DP	--	--
Naphthalene	1	295DP	--	--
Naphthenic acid	1	--	--	--
Nitrobenzene	1	303G	--	--
		303(j)	--	--
		304(k)	--	--
		305(i)	--	--

(Continued)

TABLE E-7. (Continued)

Compound	EPA Toxicological Criteria[b]	Appendix Table Item Numbers[c]		
		IOC	DP-R	DP-I
Nitrophenol	1	308G 308[j] 309[k]	-- -- --	-- -- --
Paraformaldehyde (Paraform)	1	67ADD	--	--
Pentachlorophenol	1	--	--	--
Phenol	1	331DP	--	--
Phosgene	1	337	--	--
Polychlorinated biphenyls (PCB)	1	--	--	--
Propionic acid	1	349	--	--
Propionic anhydride	1	--	--	--
Propyl alcohol	1	350	--	--
Quinoline	1	--	--	--
Resorcinol	1	358DP	--	--
Styrene	1	368	--	--
Tetraethyl lead	1	377	--	--
Tetraethylpyrophosphate	1,2	--	--	--
Toluene	1	--	30	--
Trichlorophenol	1	84ADD	--	--
Triethylamine	1	397	--	--
Trimethylamine	1	401	--	--
Vinyl acetate	1	403	--	--
Xylene	1	407DP	--	--
Xylenol	1	410G 410[l] 411[m] 412[n] 413[o] 414[p]	-- -- -- -- -- --	-- -- -- -- -- --

See footnotes on following page.

Footnotes for Table F-7.

(a) Reference 6.

(b) Toxicological criteria.

1 = aquatic animal toxicity
2 = oral mammalian toxicity
3 = dermal mammalian toxicity.

(c) Item numbers in master Tables A-1, B-1, and B-2.

IOC = Industrial Organic Chemicals
DP-R = Dye and Pigment Raw Material
DP-I = Dye and Pigment Intermediate
G = commercial isomer mixture.

(d) η-

(f) sec-

(g) tert-

(h) Cresylic acid

(i) m-

(j) o-

(k) p-

(ℓ) 2,4-

(m) 2,5-

(n) 3,4-

(o) 3,5-

(p) 2,6-

APPENDIX G

ORGANIC DYES AND PIGMENTS - EXTRACTION TABLES BASED ON TOXICITY AND PRODUCTION VOLUME DATA IN TABLES B-1 THROUGH B-2

TABLE G-1. U. S. OCCUPATIONAL STANDARD (USOS) FOR CONCENTRATIONS IN AIR - ORGANIC DYES AND PIGMENTS

[Listed alaphabetically according to compound]

Compound(a)	Concentration(b)	Compound(a)	Concentration(b)
DP-RO 3	0.5 mg/m^3	DP-RI 29	1 mg/m^3
DP-RO 9	50 ppm	DP-RI 33	1 mg/m^3
DP-RO 11	10 ppm	DP-RI 34	0.5 ppm
DP-RO 15	1 ppm	DP-RI 37	2 mg/m^3
DP-RO 20	25 ppm	DP-RI 45	3.2 mg/m^3
DP-RO 23	0.5 ppm	DP-RI 49	1 ppm
DP-RO 25	1 mg/m^3	DP-RI 50	1 ppm
DP-RO 30	100 ppm	DP-RI 54	1 mg/m^3
DP-RI 5	10.2 mg/m^3	DP-I 83	5 ppm (skn)(c)
DP-RI 6	0.5 mg/m^3	DP-I 93	2 ppm (skn)
DP-RI 7	806 μg/m^3	DP-I 98	1 ppm (skn)
DP-RI 7	0.5 mg/m^3	DP-I 104	0.1 ppm (skn)
DP-RI 16	1 mg/m^3	DP-I 105	0.1 ppm (skn)
DP-RI 18	5 ppm	DP-I 280	1 mg/m^3 (skn)
DP-RI 19	0.1 ppm	DP-I 291	1 mg/m^3 (skn)
DP-RI 21	258 μg/m^3	DP-I 674	100 μg/m^3 (skn)
DP-RI 22	230 μg/m^3	DP-I 683	0.1 mg/m^3
DP-RI 23	10 mg/m^3	DP-I 743	5 ppm
DP-RI 26	0.05 mg/m^3	DP-I 744	5 ppm
DP-RI 27	3 mg/m^3	DP-I 745	5 ppm
DP-RI 28	1 mg/m^3		
DP-D 447	1 ppm		

(a) Item number of compound in Organic Dyes and Pigment table.
DP-RO: Dyes and Pigments - organic raw material;
DP-RI: Dyes and Pigments - inorganic raw material;
DP-I: Dyes and Pigments - intermediate;
DP-D: Dyes and Pigments - dye

(b) Time weighed average (TWA).

(c) (skn) indicates additional absorption through the skin is possible even when the concentration is below the indicated standard.

TABLE G-2. HUMAN TOXICITY DATA - ORGANIC DYES AND PIGMENTS

Compound Number[(a)]	LDLo	TDLo	TCLo	TFX	Adm[(b)]
DP-RO 29	--	--	10 ppm	CNS	ihl
DP-RI 19	2000 mg/kg	--	--	--	orl
DP-RI 23	--	--	400 mg/m^3	UNS	ihl
DP-RI 29	--	--	800 μg/m^3	MTH	ihl
DP-RI 29	--	--	350 μg/m^3	PUL	ihl
DP-RI 30	--	25 ppm/30M	--	IRR	ihl
DP-RI 54	--	--	4800 mg/m^3/30M	PUL	ihl
DP-I 44	--	1000 mg/kg	--	CNS	orl
DP-I 63	--	--	44 mg/m^3	BLD	ihl
DP-I 76	--	--	25 μg/m^3	EYE	ihl
DP-I 279	--	--	12 μg/m^3	EYE	ihl
DP-I 482	--	500 mg/kg	--	SKN	skn
DP-I 708	--	5100 μg/m^3	--	IRR	ihl
DP-D 447	40 mg/kg	--	--	--	ivn

(a) Item number of compound in Organic Dyes and Pigments table.
DP-RO: Dyes and Pigments - organic raw material;
DI-RI: Dyes and Pigments - inorganic raw material;
DI-I: Dyes and Pigments - intermediate;
DP-D: Dyes and Pigments - dye.

(b) Method of administration (see list of abbreviations and acronyms).

TABLE G-3. CARCINOGENS AND SUSPECTED CARCINOGENS - ORGANIC DYES AND PIGMENTS

Compound[(a)]	TDLo	TFX	Adm-Animal[(b)]
DP-RO 10	280 mg/kg/35W	NEO	scu-rat
DP-RO 15	400 mg/kg/5WI	CAR	ipr-mus
DP-RO 27	10 gm/kg/3WI	NEO	skn-mus
DP-RO 29	18 gm/kg/2YC	NEO	orl-rat
DP-RI 8	8 gm/kg/50W	NEO	ivg-mus
DP-RI 27	350 mg/kg/43WI	CAR	ims-rat
DP-RI 28	15 mg/kg/6WI	NEO	scu-rat
DP-RI 54	17 mg/kg	NEO	par-ham
DP-I 84	7300 mg/kg/1Y	NEO	orl-rat
DP-I 130	90 gm/kg/90DC	NEO	orl-rat
DP-I 131	2740 mg/kg/61WI	NEO	orl-rat
DP-I 225	17 gm/kg/2YI	NEO	scu-rat
DP-I 226	4 mg/kg	CAR	scu-rat
DP-I 429	5300 mg/kg/35WC	CAR	orl-rat
DP-I 434	26 gm/kg/50W	CAR	orl-rat
	6.5 mg/kg/44WI	CAR	scu-rat
DP-I 441	9000 mg/kg/30DI	NEO	orl-rat
DP-I 459	37 gm/kg/61W	CAR	skn-mus
DP-I 480	16 gm/kg/1YI	NEO	scu-rat
DP-I 633	Bladder carcinogen - hmn	-	-
	31 gm/kg/YI, 25 mg/kg	NEO	scu-mus
DP-I 634	dl gm/kg/YI	CAR	orl-rat
DP-I 635	31 gm/kg/YI	CAR	orl-rat
DP-I 637	Recognized carcinogen - hmn	-	-
DP-I 743	Recognized carcinogen - hmn	-	-
DP-I 744	Recognized carcinogen - hmn	-	-
DP-I 745	Recognized carcinogen - hmn	-	-

(Continued)

TABLE G-3. (Continued)

Compound(a)	TDLo	TFX	Adm-Animal(b)
DP-D 10	1600 mg/kg/2.3 YI	CAR	skn-rat
DP-D 14	800 mg/kg/40D	CAR	orl-rat
Ditto	11 gm/kg/12WC	NEO	orl-mus
DP-D 30	158 gm/kg/56WC	NEO	orl-mus
DP-D 52	56 gm/kg/52WC	NEO	orl-mus
DP-D 61	6 gm/kg/52W	CAR	scu-mus
DP-D 63	80 mg/kg	NEO	imp-mus
DP-D 126	428 gm/kg/65WC	CAR	orl-rat
DP-D 169	2750 mg/kg/28WI	NEO	scu-rat
DP-D 177	172 gm/kg/26WC	CAR	orl-rat
DP-D 181	524 gm/kg/74WC	CAR	orl-rat
DP-D 316	825 mg/kg/65WI	CAR	scu-rat
DP-D 343	512 mg/kg/58WI	CAR	scu-rat
DP-D 559	40 gm/kg/87WC	CAR	orl-rat
DP-D 576	6500 mg/kg/33WI	NEO	scu-rat
DP-D 577	5925 mg/kg/48WI	CAR	scu-rat
DP-D 579	600 mg/kg/43WC	CAR	orl-rat
DP-D 580	17 gm/kg/2YI	CAR	scu-rat
DP-D 583	1290 gm/kg/86WC	CAR	orl-rat
DP-D 608	9400 mg/kg/2YI	NEO	scu-rat
DP-D 631	270 gm/kg/30WI	CAR	scu-rat
DP-D 648	7200 mg/kg/44WI	NEO	scu-rat
DP-D 873	10 gm/kg/2YI	CAR	scu-rat

(a) Item number of compound in Organic Dyes and Pigments table.
DP-RO: Dyes and Pigments - organic raw material;
DP-RI: Dyes and Pigments - inorganic raw material;
DP-I: Dyes and Pigments - intermediate;
DP-D: Dyes and Pigments - dye.

(b) Method of administration and animal (see list of abbreviations and acronyms).

TABLE G-4. ORAL TOXICITY (RAT) - ORGANIC DYES AND PIGMENTS, RAW MATERIALS

Rating Order	ODP Item Number[(a)]	LD50, mg/kg	Carcinogen[(b)]
1	29	20	+
2	15	60	+
3	7	75	--
4	3	115	--
5	22	148	--
6	11	698	--
7	2	1830	--
8	9	2060	--
9	18	3200	--
10	30(c)	5000	--

(a) Item number of compound in Organic Dyes and Pigments Table B-1.

(b) A plus (+) indicates that this compound is a known or suspected carcinogen.

(c) Production volume 3100 (6658).

TABLE G-5. ORAL TOXICITY (RAT) - ORGANIC DYES AND PIGMENTS, INTERMEDIATES

Rating Order	ODP Item Number(a)	LD50, mg/kg	Carcinogen(b)	1973 Production Volume, MM kg
	1 to 50(c,d)			
1	2	30	-	-
2	667	30	-	0.45
	51 to 100			
3	84	65	+	-
	101 to 300(e,f)			
4	499	120	-	-
5	445	144	-	-
6	459	224	+	-
7	278	288	-	-
8	63	300	-	-
	301 to 500			
9	480	301	+	-
10	645	375	-	-
11	555	400	-	-
12	85	418	-	0.3
13	668	447	-	-
14	750	464	-	-
15	764	467	-	-
	501 to 700			
16	96	535	-	-
17	97	535	-	-
18	226	620	+	-
19	76	648	-	-
20	47	664	-	-
21	95	681	-	0.8
	701 to 1000			
22	112	704	-	-
23	423	717	-	-
24	635	727	+	-

(Continued)

TABLE G-5. (Continued)

Rating Order	ODP Item Number[(a)]	LD50, mg/kg	Carcinogen[(b)]	1973 Production Volume, MM kg
25	633	779	+	-
26	10	800	-	1.7
27	61	880	-	-
28	743	974	+	-
29	225	1000	+	-
	1001 to 1500			
30	277	1070	-	-
31	105	1400	-	-
32	77	1500	-	-
33	748	1500	-	-
	1501 to 2000			
34	58	1620	-	-
35	343	1640	-	-
36	44	1650	-	-
37	11	1830	-	-
	2001 to 3000			
38	466	2230	-	-
39	20	2400	-	-
40	613	2420	-	-
41	427	2460	-	-
42	669	2828	-	-
43	471	2830	-	-
	3001 to 4000			
44	716	3020	-	-
45	98	3249	-	-
46	12	3350	-	-
47	451	3360	-	-
	> 4000			
48	380	4250	-	-

Footnotes on following page.

Footnotes for Table G-5.

(a) Item number of compound in Organic Dyes and Pigments Table B-2.

(b) A plus (+) indicates that this compound is a known or suspected carcinogen.

(c) LD50 value range.

(d) Item number 758 has LD50, oral-bdw = 3. Item No. 291, Ibid = 42.

(e) Item numbers 64, 72, 81, and 390 have LD50, oral-bdw = 100.

TABLE G-6. ORAL TOXICITY (RAT) - ORGANIC DYES AND PIGMENTS, DYES

Rating Order	ODP Item Number(a)	LD50, mg/kg	1973 Production Volume, MM kg
1	446	535	--
2	14	800	--
3	598	1000	--
4	599	1000	--
5	655	1895	155
6	631	2000	--
7	839	2000	--
8	447	3249	--

(a) Item number of compound in Organic Dyes and Pigments Table B-3.

TABLE G-7. ORGANIC DYE AND PIGMENT HUMAN AND ANIMAL TOXICITY AND CARCINOGEN DATA ADDED DURING 1979 REVISION(a,b)

Item No.	Human Toxicity	Animal Toxicity	Carcinogen
3	LD50:50 mg/kg, orl	--	--
9	LDLo:500 mg/kg, orl	--	--
10	LDLo:50 mg/kg, orl	--	--
15	--	LD50:20 mg/kg ivn-rbt	--
18	--	LD50:210 mg/kg ipr-mus	--
28	--	LDLo:11 mg/kg ivn-rbt	--
30	LDLo:50 mg/kg, orl	--	--

(a) All new human toxicity data are included. All this data are from reference 39, as cited in reference 2, 1977 edition. Animal data includes all new LD50 or LDLo data $\leq$ 500 mg/kg and all LC50 or LCLo data $\leq$ 1000 ppm or 200 mg/m^3. No new teratogenic, mutagenic, or carcinogen data were found for the items in Table B-1.

(b) Update of Table G-5, ODP Raw Materials.

APPENDIX H

USSR MAXIMUM ALLOWABLE CONCENTRATIONS OF HARMFUL COMPOUNDS IN WORKING - AREA AND INHABITED AREA ATMOSPHERES

TABLE H-1. COMPARISON OF UNITED STATES AND USSR OCCUPATIONAL STANDARDS

IOC Number	Compound Name	USOS(a), ppm	mg/M^3	
			USOS	MAC(b)
3	Acetaldehyde	200	360	5
7	Acetic acid	10	25	5
8	Acetic anhydride	5	20	--
9	Acetone	1000	2400	200
11	Acetonitrile	40	70	--
13	Acetylene	20% may cause headache in hmns; 40% may cause collapse(c)	--	--
14	Acrolein	0.1	0.25	0.7
15	Acrylamide	--	0.3s(b)	--
17	Acrylonitrile	20s(d)	45s	0.5
19	Allyl alcohol	2s	5s	2
20	Allyl chloride	1	3	--
24	n-Amyl acetate	100	525	100
30	Aniline	5s	19s	1s
33	o- and p-Anisidine	--	0.5s	1s
39	Benzene	10(c)	--	5s
48	p-Benzoquinone	0.1	0.4	0.05
49	Benzotrichloride	1(c)	--	0.5 or 0.2
56	Biphenyl	0.2(c)	1(c)	--
57	Bisphenol A	0.5	2.8	5
60	Butadiene	1000	2200	--
61	Butane	500(c)	--	300
62	n-Butanol	100	300	10
67	n-Butyl acetate	150	710	200
68	sec-Butyl acetate	200	950	--

(Continued)

TABLE H-1. (Continued)

IOC Number	Compound Name	USOS[(a)], ppm	mg/M³	
			USOS	MAC[(b)]
69	tert-Butyl acetate	200	950	--
71	sec-Butyl alcohol	150	450	--
72	tert-Butyl alcohol	100	300	--
73	n-Butylamine	C 5s[(e)]	C 15s	10
79	tert-Butyl toluene	10	60	--
84	Carbon disulfide	20	--	10
85	Carbon tetrabromide	0.1[(c)]	--	--
86	Carbon tetrachloride	10s	65s	20s
94	Chlorobenzene	75	350	50s
101	Chloroform	C 50 (10 rec'd by NIOSH)	240	--
111	m-Cresol	5s	22s	--
112	o-Cresol	5s	22s	--
113	p-Cresol	5s	22s	--
111G	Cresylic acid	5s	22s	--
114	Crotonaldehyde	2	6	0.5
116	Cumene	50	245	50
122	Cyclohexane	300	1050	80
123	Cyclohexanol	50	200	--
124	Cyclohexanone	50	200	10
125	Cyclohexene	300	1015	--
126	Cyclohexylamine	10s[(c)]	--	--
129	Diacetone alcohol	50	240	--
133	o-Dichlorobenzene	C 50	C 300	20
134	p-Dichlorobenzene	75	450	20
135	Dichlorodifluoromethane	1000	4950	--
136	1,2-Dichloroethylene	200	790	--
137	Dichloroethylether	C 15s	C 90s	--
143	Diethylamine	25	75	30
160	Dimethylamine	10	18	1

(Continued)

TABLE H-1. (Continued)

IOC Number	Compound Name	USOS(a), ppm	mg/M3	
			USOS	MAC(b)
161	N,N-Dimethylaniline	5s	25s	0.2
163	N,N-Dimethylformamide	10s	30	10
164	Dimethyl sulfate	1s	5	--
167	m-Dinitrobenzene	--	1s	1s
168	p-Dinitrobenzene	--	1s	1s
176	p-Dioxane	100s	360s	10s
179	Diphenyl oxide (phenyl ether)	1	7	--
185	Epichlorohydrin	5s	19s	1
187	Ethanol	1000	1900	1000
188	Ethanolamine	3	6	--
189	Ethyl acetate	400	--	200
192	Ethylamine	10	18	--
193	Ethylbenzene	100	435	--
194	Ethyl bromide	200	890	5
196	Ethyl chloride	1000	2600	50
201	Ethylene chlorohydrin	5s	16s	0.5
202	1,2-Ethanediamine	10	25	2
203	Ethylene dibromide	C 20	--	--
204	Ethylene dichloride	50	--	10s
205	Ethylene glycol	100(c)	260(c)	--
211	Ethylene glycol monobutyl ether	50s	240	--
213	Ethylene glycol monoethyl ether	200s	740	--
214	Ethylene glycol monoethyl ether acetate	100s	540	--
216	Ethylene glycol monoethyl ether	25s	80	--
217	Ethylene glycol monomethyl ether acetate	25s	120	--
221	Ethylene oxide	50	90	1
222	Ethyl ether	400	1200	300
227	Formaldehyde	3	--	0.5
228	Foramide	20	--	3

(Continued)

TABLE H-1. (Continued)

IOC Number	Compound Name	USOS(a), ppm	mg/M^3	
			USOS	MAC(b)
229	Formic acid	5	9	--
232	Glycerine	--	10(c)	--
238	Hexachloroethane	1s	10	--
242	Hexylene glycol	25(c)	125	--
243	Hydrogen cyanide	10s	11	--
244	Hydroquinone	--	2	--
245	Isoamyl alcohol	100	360	--
248	Isobutanol	100	300	--
249	Isobutyl acetate	150	700	--
255	Isophorone	25	140	--
258	Isopropyl acetate	250	950	--
259	Isopropyl alcohol	400	980	--
260	Isopropyl amine	5	12	1
263	Ketene	0.5	0.9	--
265	Maleic anhydride	0.25	1	1
267	Mesityl oxide	25	100	--
270	Methacrylonitrile	1s	--	--
273	Methyl acetate	200	610	100
275	Methyl alcohol	200	260	5
276	Methyl amine	10	12	1
277	N-Methyl aniline	2s	9s	--
279	Methyl chloride	100	--	5
280	Methyl cyclohexane	500	2000	50
281	Methyl cyclohexanol	100	470	--
282	Methyl cyclohexanone	100s	--	--
284	Methylene chloride	500	--	--
286	Methyl ethyl ketone	200	590	200
287	Methyl formate	100	250	--
288	Methyl isobutyl carbinol	25	100	--
289	Methyl isobutyl ketone	100	410	--

(Continued)

TABLE H-1. (Continued)

IOC Number	Compound Name	USOS(a), ppm	mg/M^3	
			USOS	MAC(b)
292	α-Methyl styrene	C 100	480	5
294	Morpholine	20s	70	0.5
295	Naphthalene	10	50	20
302	Nitrobenzene	1s	5	3
306	Nitroethane	100	310	30
307	Nitromethane	100	250	30
310	1-Nitropropane	25	90	30
311	2-Nitropropane	25	90	--
312	o-Nitrotoluene	5s	30	--
313	p-Nitrotoluene	5s	30	--
314	m-Nitrotoluene	5s	30	--
322	Pentaerythritol	--	10(c)	--
323	n-Pentane	1000	2950	--
327	Perchloroethylene	100	--	10
328	Perchloromethylmercaptan	0.1	0.8	1
331	Phenol	5a	19	5s
336	p-Phenylenediamine	--	0.1s	--
337	Phosgene	0.1	0.4	0.5
338	Phthalic anhydride	2	12	1
347	Propane	1000	--	--
350	n-Propyl alcohol	200	500	10
355	Propylene dichloride	75	350	10
356	Propylene oxide	100	240	1s
357	Pyridine	5	15	5
358	Resorcinol	10(c)	--	--
368	Styrene	100	--	5
375	1,1,2,2-Tetrachloroethane	5	35	5
377	Tetraethyl lead	--	117 $\mu g/M^3$	5 $\mu g/M^3$
387	o-Toluidine	5s	22s	3s
391	1,1,2-Trichloroethane	10s	45s	--

(Continued)

TABLE H-1. (Continued)

IOC Number	Compound Name	USOS[(a)], ppm	mg/M^3 USOS	mg/M^3 MAC[(b)]
392	Trichloroethylene	100	--	10
393	Trichlorofluoromethane	1000	5600	--
394	1,2,3-Trichloropropane	50	300	--
395	1,1,2-Trichloropropane	1000	--	--
397	Triethylamine	25	100	10
403	Vinyl acetate	10	10	--
404	Vinyl chloride	1	2.6	30
405	Vinylidene chloride	10(c)	--	10s
406	Vinyl toluene	100	480	50
407	m-Xylene	100(c)	435(c)	50
408	o-Xylene	100(c)	435(c)	50
409	p-Xylene	100(c)	435(c)	50
415G	Xylidene (mixed)	5s	25	3s

(a) United States Occupational Standards, NIOSH Registry of Toxic Effects of Chemical Substances (1975 Edition).

(b) Maximum allowable concentrations, or maximum permissible concentration (MPC) in milligrams per cubic meter, USSR standard.

(c) Not necessarily USOS.

(d) Symbol "s" indicates skin absorption possible.

(e) Symbol "C" indicates ceiling value, i.e., the worker's exposure shall at no time exceed this value.

TABLE H-2. MAXIMUM ALLOWABLE CONCENTRATIONS OF HARMFUL COMPOUNDS IN WORKING-AREA ATMOSPHERE[(a)]

[Translated by D. K. Dreyer, Battelle]

Item Number	Compound Name	MAC[(b)], mg/M^3	Physical State[(c)]
2	Acrolein	0.7	v
3	Acrylic acid	5	v
4	Allyl cyanide	0.3s	v
7	Amyl acetate	100	v
9	Primary aliphatic amines (C_7 - C_9)	1	v
10	Higher aliphatic amines (C_{15} - C_{19})	1	v+a
11	α-Aminoanthraquinone	5	a
12	m-Aminobenzotrifluoride	0.5	v
13	5-Amino-8-oxy-3,7-dibromo-1,4-naphthoquinoneimine	1	a
14	Aminopelargonic acid	8	a
16	Aminooenanthic acid (aminoheptanoic acid, isomer unknown)	8	a
18	Anabasine-sulphate (3-(2-piperidyl) pyridyl sulphate)	0.1	v+a
19	p-Anisidine (p-aminoanisole)	1s	v
20	Aniline	3s	v
21	Blue dispersed anthraquinone dye "K" (mixture 50% 1-methylamino-4-oxyethylaminoanthraquinone and 50% disodium salt dinaphthylamine disulphonic acid)	5	a
23	Acetaldehyde	5	a
24	Acetone	200	v
25	Acetonanyl (2,2,4-trimethyl-1,2-dihydroquinoline)	1	a
26	Acetone cyanohydrine	0.9s	v
27	Acetopropylacetate (propyl ester of acetoacetic acid)	5	v
28	Acetophenone	5s	v
29	Benzal chloride	0.5	v
30	Benzyl chloride	0.5	v
31	Benzyl cyanide	0.8s	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC(b), mg/M^3	Physical State(c)
32	Benzine solvent (on conversion to C) (petroleum distillate, mostly aliphatic)	300	v
33	Benzine-fuel (shale, cracking and others) (on conversion to C)	100	v
34	Benzoyl chloride	5	v
35	Benzene	5s	v
36	Benzotrifluoride	100	v
37	Benzotrichloride	0.2	v
38	p-Benzoquinone	0.05	v
40	Bischloromethylbenzene	1	v
41	Bischloromethylxylene	1	v
42	Bischloromethylnaphthalene	0.5	v
46	Bromocetopropylacetate	0.5	v
47	Bromobenzene	3	v
48	Bromoform	5	v
49	Butyl acetate	200	v
51	Butyl acrylate	10	v
52	Butyl ester of 5-chloromethyl-1-furoic acid	0.5	a
53	Butyl ester of 2-furoic acid	0.5	a
55	Butynediol	1	v+a
56	Butyphos (tributyltrithiophosphate)	0.6s	v+a
57	Valerianic acid	5	v
59	Vinyl acetate	10	v
60	Vinylbutyl ether	20	v
61	2-Vinylpyridine	0.5s	v
62	Vinyltoluene	50	v
63	Vinyl chloride	30	v
65	Hexamethylene diamine	1	v
66	Hexamethylene diisocyanate	0.05s	v
67	Hexamethylene imine	0.5s	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC$^{(b)}$, mg/M^3	Physical State$^{(c)}$
68	Hexachlorocyclohexane	0.1	v+a
69	γ-hexachlorane (γ-hexachlorocyclohexane)	0.05s	v+a
70	Hexachloroacetone	0.5	v
71	Hexachlorobenzene	0.9s	v+a
72	Hexachlorocyclopentadiene	0.01s	v
73	Hexafluoropropylene	5	v
78	Hydrazine-hydrate, hydrazine and its derivatives	0.1s	v
79	β-Hydroxyethylmercaptan	1s	v
80	Isopropylbenzene hydroperoxide	1	v
84	Decalin	100	v
85	1,2-Dibromopropane	5	v
86	Divinyl (1,3-butadiene pseudobutylene)	100	v
87	Perfluoroacetone dihydrate	2s	v
88	Diisopropylamine	5	v
89	Disopropylbenzene	50s	v
91	Dicumyl methane	5s	a
93	Dimethylamine	1	v
94	Dimethylaniline	0.2s	v
95	Dimethylbenzylamine	5	v
96	Dimethyldioxane	10	v
97	Dimethyl sulphide	50s	v
98	Dimethylterephthalate	0.1	v+a
99	Dimethylformamide	10	v
100	Dimethylchlorothiophosphate	0.5	v
101	Dimethylethanolamine	5	v
102	Dinyl (mixture of 25% diphenyl and 75% diphenyl oxide)	10	v+a
103	Dinitrobenzene	1s	v+a
104	4,6-Dinitro-2-isopropylphenol	0.05s	v+a
105	Dinitro-o-cresol	0.05s	v+a

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC(b), mg/M^3	Physical State(c)
106	Dinitrotoluene	1s	v+a
107	Dinitrophenol	0.05s	v+a
108	Dinitro-secondary-butylphenol	0.05s	v+a
109	Dinitrile of adipic acid	20	v
110	Dinitrile of perfluoroglutaric acid	0.05	v
111	Dinitrile of perfluoroadipic acid	0.1	v
112	Dinitrothiocyanogenbenzene (probably 3,5-dinitro-1-thiocyanobenzene)	2s	a
113	Dioxane	10s	v
114	Diptane (diisopropyl trichloroallylthiocarbamate)	1	v+a
115	Di-n-Propylamine, tri-n-propylamine	2	v
116	Ditertiarybutyl peroxide	100	v
117	Ditolylmethane	1	v+a
118	Chlorinated diphenyls	1s	v
119	Chlorinated diphenyl oxide	0.5s	v
120	Diphenylolpropane (Bisphenol A)	5	a
121	3,4-Dichloroaniline	0.5s	v
122	Dichlorobenzene	20s	v
123	1,3-Dichlorobutene-2	1	v
124	Dichlorohydrin	5	v
125	1,2-Dichloroisobutane	20	v
126	1,3-Dichloroisobutylene	0.5	v
127	3,3-Dichloroisobutylene (symmetric isomer)	0.3	v
128	3,3-Dichloromethyloxacyclobutane	0.5	v
129	2,3-Dichloro-1,4-naphthoquinone	0.5	a
130	3,4-Dichloronitrobenzene	1s	v
131	1,2-Dichloropropane	10	v
132	1,3-Dichloropropylene	5	v
133	2,3-Dichloropropylene	3	v
134	3,4-Dichlorophenylisocyanate	0.3	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC$^{(b)}$, mg/M^3	Physical State$^{(c)}$
135	Dichlorophenyltrichlorosilane (HCl verification obligatory)	1	v
136	Dichloroethane	10s	v
137	1,1-Dichloroethylene (vinylidene chloride)	10s	v
138	Dicyclopentadiene	1s	v
139	Diethylamine	30	v
140	β-Diethylaminoethylmercaptane	1s	v
141	Diethylaminoethyl methacrylate	800	v
142	Diethylbenzene	10	v
143	Diethyl ester of perfluoroadipic acid	0.1	v
144	Diethyl ester of perfluoroglutaric acid	0.1	v
145	Diethylchlorothiophosphate	1	v
146	Diethylethanolamine	5	v
147	Dodecylmercaptane (tertiary)	5	v
148	Isobutylene	100	v
149	Isobutylene chloride	0.3	v
150	Isoprene	40	v
151	Isopropylaminodiphenylamine	2	a
152	Isopropylbenzene (cumene)	50	v
153	Isopropylnitrate	5	v
154	Isopropylnitrite	1s	v
155	Isopropylchlorocarbonate	0.1	v
156	Isopropyl-N-phenylcarbamate	2	v+a
157	Isopropyl-N-3-chlorophenylcarbamate	2	v+a
162	Camphor	3	v
163	Caprolactam	10	a
164	Caproic acid	5	v
168	Kerosene (in conversion to C)	300	v
171	Crotonaldehyde	0.5	v
172	Butylic K nthogenate	10	a

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[b], mg/M^3	Physical State[c]
173	Xylidine	3s	v
174	Xylene	50	v
175	Ligroin (in conversion to C)	300	v
177	Butyraldehyde	0.5	v
178	Butyric anhydride	1	v
179	Butyric acid	10	v
180	Maleic anhydride	1	v+a
185	Methacrylic acid	10	v
186	Methacrylic acid anhydride	1	v
189	Methyl acetate	100	v
190	Methyl bromide	1	v
191	Methyl chloride	5	v
192	2-Methyl-5-vinylpyridine	2s	v
193	6-Methyl-2-vinylpyridine	0.5s	v
194	Methyl hexyl ketone	200	v
195	Methylene bromide	10	v
196	Methylene chloride	50	v
197	Methyl vinyl ketone	0.1s	v
198	Methylthiophene (2 and 3 isomers)	20	v
199	Methyldihydropyrane	5s	v
200	Methylisothiocyanate	0.1s	v
203	1-Methylnaphthaline, 2-methylnaphthaline	20	v
205	Methyl acrylate	20	v
206	Methylpyrrolidone	100	v+a
207	Methyl propyl ketone	200	v
208	Methylfluorophenyldichlorosilane (obligatory HCl control)	1	v
209	Methyl chloroacetate	5	v
210	Methylcyclohexane	50	v
211	Methyl ethyl ketone	200	v
212	2-Methyl-5-ethylpyridine	2s	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[b], mg/M^3	Physical State[c]
217	Monobutylamine	10	v
218	Monovinylacetylene	20	v
219	Monoisopropylamine	1	v
220	Monomethylamine	1	v
221	m-Monomethyl ether of resorcinol	0.5s	v
222	Monochloroodibromotrifluoroethane	50	v
223	Monochlorodimethyl ether	0.5	v
224	Monochloro-, dichlorostyrene	50	v
225	Monochlorocyclohexane	50	v
226	Morpholine	0.5s	v
229	Sodium triocyanate (technical)	50	a
230	Naphthalene	20	v
231	Chlorinated naphthalines (high)	0.5s	v
232	α-Naphthoquinone	0.1	v
236	Nicotine sulphate (3-(1-methyl-2-pyrrolidyl) pyridine sulphate)	0.1	v+a
237	Nitrophene (containing alkylphenols 72.5-67.5%)	1	v
238	Acrylonitrile	0.5s	v
239	p-Nitroanisole	3	v
240	p-Nitroaniline	0.1s	a
241	o-Nitroaniline	0.5s	a
242	m-Nitrobenzotrifluoride	1	v
243	Nitromethane, nitroethane, nitropropane, nitrobutane	30	v
244	Nitroxylene	5s	v
245	Nitrocompounds of benzene	3s	v
246	Nitroform	0.5	v
249	Nitrochlorobenzene, dinitrochlorocompounds of benzene	1s	v
250	Nitrocyclohexane	1	v
252	p-Oxydiphenylamine	0.5	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[b], mg/M^3	Physical State[c]
253	Oxycarbamate	0.5	v+a
254	Octamethyl (octamethyltetramide of pyrophosphoric acid)	0.2s	v+a
255	Octafluorodichlorocyclohexene	1	v
257	Pentafluoropropionic acid	2	v
258	Pentachloroacetone	0.5	v
259	Pentachloronitrobenzene	0.5	v+a
260	Pentachlorophenol	0.1	v+a
261	Pentachlorophenolate of sodium	0.1	v+a
262	Perfluoroisobutylene	0.1	v
263	Perchloromethylmercaptan	1	v
264	Picolines (mixture of isomers)	5	v
265	Piperidine	0.2	v
266	Pyridine	5	v
275	Propanide (3,4-dichloropropione anilide)	0.1	a
276	Propylene oxide	1s	v
277	n-Propylamine	5	v
278	Propylacetate	200	v
279	Propylpropionate	70	v
280	Propionic aldehyde	5	v
291	Carbon disulfide	10	v
294	Spirits of turpentine (on conversion to C)	300	v
295	Solvent naphtha (on conversion to C)	100	v
298	Unsaturated alcohols of the fatty series (allyl, crotonyl, etc.)	2	v
299	Methyl alcohol (methanol)	5	v
300	Ethyl alcohol	1000	v
301	Propyl alcohol	10	v
302	Amyl alcohol	10	v
303	Acetopropyl alcohol	10	v
304	Butyl alcohol	10	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[(b)], mg/M^3	Physical State[(c)]
305	n-Hexylic alcohol	10	v
306	n-Heptyl alcohol	10	v
307	n-Octyl alcohol	10	v+a
308	n-Nonyl alcohol	10	v+a
309	n-Decyl alcohol	10	v+a
310	Propargyl alcohol	1	v
311	Octafluoroamyl alcohol	20	v
312	Trifluorobutyl alcohol	20	v
313	Trifluoroethyl alcohol	10	v
314	Tetrafluoropropyl alcohol	20	v
315	Isooctyl alcohol (2-ethylhexanol)	50	v
316	Styrene, α-Methylstyrene	5	v
325	Terephthalic acid	0.1	v+a
326	Tetrabromethane	1	v
327	Tetrahydrofuran	100	v
328	Tetralin	100	v
329	Tetranitromethane	0.3	v
330	Tetrachlorohexatriene	0.3s	v
331	Tetrachloropropane, tetrachloropentane, tetrachloroheptane	1	v
332	Tetrachlorononane	1	v+a
333	Tetrachlorundecane	5	v+a
335	Tetrachloroethylene	10	v
336	Tetraethyl lead	0.005s	v
337	Tetraethoxysilane	20	v
339	Thioglycolic acid	0.1s	v+a
341	Thiophene	20	v
343	Thiuram, TMTD (tetramethylthiuram disulfide)	0.5	a
345	Toluidine	3s	v
346	Toluene diamino	2s	v+a
347	Toluene diisocyanate	0.5	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[(b)], mg/M^3	Physical State[(c)]
348	Toluene	50	v
350	Tertiary-butylperacetate	0.1	v
351	Tertiary-butylperbenzoate	1	v
352	Tricresylphosphate, containing more than 3% orthoisomers	0.1s	a
353	Tricresylphosphate, containing less than 3% orthoisomers	0.5s	a
355	Trimethylamine	5	v
356	Trimethylolpropane	50	v
357	Trinitroluene	1s	v
358	1,1,3-Trichloroacetone	0.3	v
359	Trichlorobenzene	10	v
360	Trichloropropane	2	v
361	Trichloropropylene	3	v
362	Trichlorosilane (obligatory HCl verification)	1	v
363	Trichloroethylene	10	v
365	Trichloronaphthalene (mixture of tetra- and penta-chloronaphthalenes)	1s	v+a
366	Copper trichlorophenolate	0.1	a
367	Trifluoropropylamine	5	v
368	Trifluoroacetate acid	2	v
369	Trifluorochloropropane	1s	v
370	Trifluoroethylamine	100	v
371	Triethylamine	10	v
372	Triethoxysilane	1	v
375	Saturated aliphatic hydrocarbons C_1 - C_{10} (on conversion to C)	300	v
376	Carbon tetrachloride	20s	v
377	Acetic acid	5	v
380	p-Phenetidine hydrochloride (? chloride)	0.5	a
381	Phenylmethyldichlorosilane (HCl control obligatory)	1	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC(b), mg/M^3	Physical State(c)
382	m-Phenoxyphenol	1s	v
383	Phenol	5s	v
385	Formaldehyde	0.5	v
386	Formamide	3	v
387	Phosgene	0.5	v
392	Phthalic anhydride	1	v+a
397	Furan	0.5	v
398	Furfural	10	v
402	p-Chloraniline	0.3s	v
403	Trichloroacetyl chloride	0.1s	v
404	Acid chloride of acrylic, methacrylic acids	0.3	v
405	m-Chloroaniline	0.05s	v
406	Chloroacetopropylacetate	2	v
407	Chlorobenzene	50s	v
408	1,3-Chlorobromopropane	3	v
409	4-Chlorobenzophenol-2-carboxylic acid	1	a
412	5-Ethoxyphenyl-1,2-thiazothionic chloride	0.2	a
414	Chloromethyltrichlorosilane (HCl control obligatory)	1	v
415	Chloroprene	2	v
417	Chloropropionic acid	5	v
418	Chloropelargonic acid	5	v
419	m-Chlorophenylisocyanate, p-chlorophenylisocyanate	0.5	v
420	m-Chlorophenol	1s	v
422	2-Chloroethanesulfochloride	0.3s	v
425	Cyanuric chloride (trichlorotriazine)	0.1	v
426	Free cyanamide	0.5s	v+a
427	Cyclohexane	80	v
428	Cyclohexanone	10	v
429	Cyclohexylamine	1	v
430	Cyclohexylamine carbonate	10	v

(Continued)

TABLE H-2. (Continued)

Item Number	Compound Name	MAC[(b)], mg/M^3	Physical State[(c)]
431	Cyclohexylamine chromate	2s	v
432	Cyclohexanone oxime	10	v
434	Cyclopentadiene	5	v
440	Epichlorohydrin	1	v
442	2-Ethylhexenal	3	v
443	Ethylacetate	200	v
444	Ethylene oxide	1	v
445	Ethylene diamine	2	v
446	Ethylene imine	0.02s	v
447	Ethylene sulfide	0.1s	v
448	Ethylene diacetate	30	v
449	Ethylene chlorohydrin	0.5	v
450	Ethylmercaptan	1	v
453	Ethyl ether, diethyl ether	300	v
454	Ethyltoluene	50	v
455	Ethyl bromide	5	v
456	Ethyl chloride	50	v
457	Ether sulfanate (?) (p-chlorophenyl-p-chlorobenzosulfanate)	2	v+a

(a) Zdravookhraneniye SSSR, 1970, 18 pages. Item numbers reproduced from reference.

(b) Maximum allowable concentration, or maximum permissible concentration (MPC) in milligrams per cubic meter (s = dangerous also in contact with the skin).

(c) Physical state of chemical? v = vapor or gaseous state; a = aerosol.

TABLE H-3. MAXIMUM ALLOWABLE CONCENTRATIONS OF HARMFUL SUBSTANCES IN ATMOSPHERIC AIR OF INHABITED AREAS - USSR(a)

Industrial Organic Chemical	MAC(b), mg/M^3 Maximum Single	MAC(b), mg/M^3 Average 24 hr
Acrolein	0.30	0.10
Amyl acetate	0.10	0.10
Aniline	0.05	0.03
Acetone	0.35	0.35
Acetophenone	0.003	0.003
Benzene	2.1	0.80
Butyl acetate	0.1	0.1
Vinyl acetate	0.2	0.2
Dichloroethane	3.0	1.0
Dimethylformamide	0.03	0.03
Dinyl(c)	0.01	0.01
Methanol	1.5	0.5
Methyl acetate	0.07	0.07
Methyl methacrylate	0.1	0.1
Styrene	0.003	0.003
Formaldehyde	0.005	0.012
Toluene diisocyanate	0.05	0.02
Phenol	0.01	0.01
Furfural	0.05	0.05
Chloroprene	0.26	0.8
Ethyl acetate	0.1	0.1

(a) U.S.S.R. Literature on Air Pollution and Related Occupational Diseases, 15 (1964), translated by B. S. Levine (available NTIS, PB 179140).

(b) Maximum Allowable Concentration (or MPC, Maximum Permissible Concentration). MAC's approved by Chief USSR Government Sanitary Inspector, 20 June 1963.

(c) Apparently a mixture of 25% diphenyl and 75% diphenyl oxide.